AMERICAN JOURNAL

OF

OBSTETRICS AND GYNECOLOGY

Original Communications

THE INFLUENCE OF DIET ON LACTATION*

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THE question of milk production is one of very great importance, whether it concerns the mammalia in general, the dairy animals, or the human being.

The most vital problem as well as the primary purpose of milk secretion is that of furnishing food to the suckling young of the large group of mammifera. So far as the large group of milk-producing animals is concerned, the primary object of the performing of this function still holds good. This is definitely true of the human species.

There are, however, certain species of animals whose milk supply is particularly abundant and whose organs are so constructed as to make this supply easily available by artificial means. These animals have been used and are being increasingly used for the purpose of obtaining food not only for their own young but also for the offspring of other animals, and especially for human infant, child, and adult.

The commercial development of the dairying industry has been enormous and has been accompanied by considerable research, not only into health problems involved in the handling and distribution of milk, but further, into eugenics, and also into economic questions. The object of the last two mentioned investigations has been to secure the type of animal which, under proper surroundings, care, and diet, would produce the most and the best milk for the least cost.

Many thousands of dollars and enormous amounts of time and energy have been spent in the investigation of these health and, espe-

*Read at the Forty-ninth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 15 to 17, 1924.

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cially, economic problems involved in the dairying industry. This has been done largely because it is a commercial affair and where dollars are involved they are easily secured for purposes of making and saving more dollars. In human beings the milk production has not been and probably will not be commercialized except to a very limited extent.

Human milk production has, however, a very vital interest for the future health and welfare of the human offspring. This self-evident fact, known intuitively by lower animals and less civilized humans, was partially forgotten by their more highly cultured relations, who sought some easier and less exacting means of rearing their offspring. It is now being more and more appreciated that human milk is by far the best and at times almost the sole food which will furnish the requisite suitable nourishment to the young, and perhaps premature or immature infant.
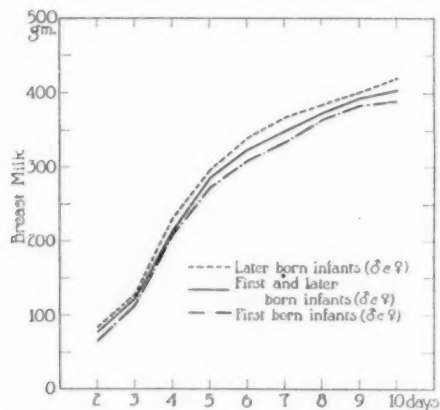
Fig. 1.—Infants' daily breast milk ingestion with mothers on a hospital diet.

In spite of its importance, very little study has been given to the effect of maternal surroundings, care, and food upon the production of human milk. These questions have engrossed the time and attention of dairymen but not that of those occupying their time and energy with the care of human mothers and offspring. Such information as we have is empirical, superficial, and not very scientific. We can, of course, profit to some extent by the work of those who have investigated similar problems in studying the milk production of animals.

Such investigations as have been conducted might be grouped into (1) those done on laboratory animals, (2) those performed upon dairy animals, and (3) those very limited observations which have been made concerning the human mother. It might be well to briefly summarize some of the investigations which have been made in the above mentioned methods.

Ssubotin, in 1866, quoted from various authors and found that most of the experiments had been conducted on herbivorous animals and that the results had been contradictory. Boussingault and la Bel, as cited by the above author, felt that in cows the kind of nutriment had little effect upon the composition of their milk. The quantity of food seemed to them to be of greater importance. Excessive nutriment increased the output of milk as well as that of casein and fat. Scanty feeding had the opposite effect. Thomson, according to Ssubotin, concluded that the kind of nourishment greatly influenced the composition of milk, and that high protein diet increased the milk fat. Playfair was thought to believe that a low protein diet increased the fat content of milk. Von Bensch was quoted as concluding, from his experiments on dogs, that a high protein diet increased the casein of the milk. A vegetable diet decreased the casein but increased the proportion of fat and sugar, which substances were reduced to a minimum on a high protein diet.

Ssubotin himself conducted his three experiments on dogs and concluded that the kind of nourishment had an important influence upon the composition of milk. He found that the increase in fat and the solid constituents was marked on a high protein diet but that the increase in casein was less marked. He believed
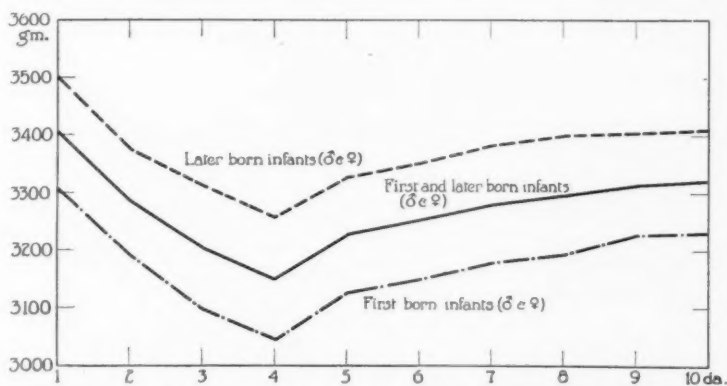
Fig. 2.—Infants' daily weight with mothers on a hospital diet.

this increase to be both actual and relative. The high protein diet also increased the total quantity of milk secretion. It decreased the sugar secretion only about 1 per cent below that of the vegetable diet. The salt content remained about the same on a meat as on a vegetable diet. He found no increase of fat on a vegetable diet, as described by some others.

By a shift from a meat to a vegetable diet he was able to show a decrease of the fat and casein and only a slight increase in the sugar content. In a high fat feeding there was only a relative increase of the solid constituents, and especially of the fat, but there was a corresponding decrease in the sugar. The quantity of milk secreted was markedly diminished on a high fat diet and reappeared on a meat diet.

The author also concluded that milk fat was to a large extent derived from the protein food.

Voit, in 1869, stated that in 1865 he conducted some experiments on a dog to determine the effect of diet upon milk secretion. He believed that while the milk secretion was somewhat independent of food that this was true to only a slight extent. The secretion decreased under starvation but increased again with proper nutrition. He thought it was greatest with abundant protein food, but he did not find the decrease in milk secretion from high fat feeding, as was reported by

Ssubotin. He proved to his own satisfaction that the protein content of milk did not stand in direct relationship to that of the food, but that it increased slightly with a high protein diet and decreased a little during inanition. He believed that the milk sugar content showed only slight variations, being the highest with high protein feeding, and that the amount of carbohydrates ingested had no influence on its secretion. He concluded that the milk secretion does not vary proportionally with the ingredients or the amount of the diet and that milk secretion is dependent first of all upon mammary development.

John and Schick, in 1923, published some careful studies on ten rats during gestation and lactation, and concluded that pregnancy did not increase food consumption but that almost immediately after delivery the consumption of food increased rapidly to more than two and one-half times the normal amount taken. They also found that these quantities taken by normal animals caused digestive disorders.

A large amount of work has been done on dairy animals. It may be of interest to quote from some of the more recent treatises dealing with dairy problems.
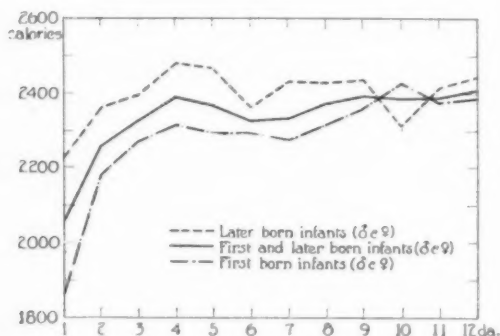
Fig. 3.—Mothers' daily caloric intake when on a high protein diet.
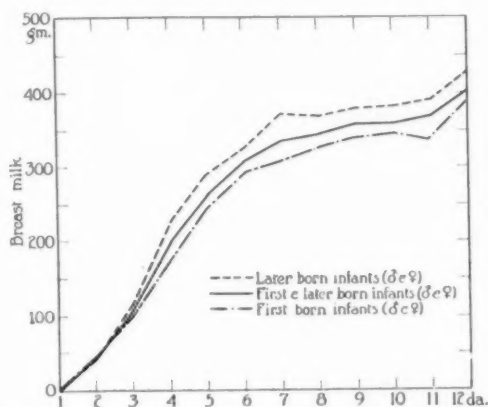
Fig. 4.—Infants' daily breast milk ingestion with mothers on a high protein diet.

Eckles states that ''The error is often made of assuming that the richness of milk varies with the feed. While it is possible under certain conditions to make a variation of possibly 0.2 to 0.4 per cent by giving certain feeds, it is only under conditions so abnormal that it is of scientific interest only and has no practical bearing. As far as the ordinary practice is concerned, the feed has no influence upon the richness of the milk. If a certain cow averages 3.4 per cent fat for a year, no one knows how to feed her to make her milk average 4.0 per cent for the following year. The richness of a cow's milk is fixed by heredity and cannot be permanently changed by any means. It is a well-known fact, however, that a cow in a high state of flesh at the time of calving gives richer milk for a short time than does one thin in flesh.''

Armsby in his work states that ''The factors governing production are essentially the same as in other branches of animal production, viz., the animal, the environment, and the feed supply. In milk production, however, the relative importance of the first and second conditions is greater than in other forms of production for the reason that they may materially influence the distribution of the excess feed between milk production and tissue increase.''

''While the actual quantity of milk produced is affected by feed, care, and

other circumstances, the capacity of the animal as a milk producer is an individual characteristic.''

''Some animals, by virtue of individual or inherited peculiarities, are able to transform large amounts of excess feed into milk without storing up any considerable portion of it in the form of body tissues. Such animals tend to remain spare in body and if well produce large amounts of milk. They are the typical dairy animals. Other individuals, on the contrary, have a well marked tendency in the opposite direction, viz., toward the production of body tissue. When fed heavily, they utilize the additional feed chiefly in this direction and show little or no tendency toward an increase in milk production. These are typical meat-producing animals. The two types, of course, shade into each other by imperceptible gradations.''

Henry and Morrison state that ''The amount of milk a cow will produce, and hence the total yield of fat, depends on the feed and care she receives, up to the point where her full capacity for milk production is reached.''
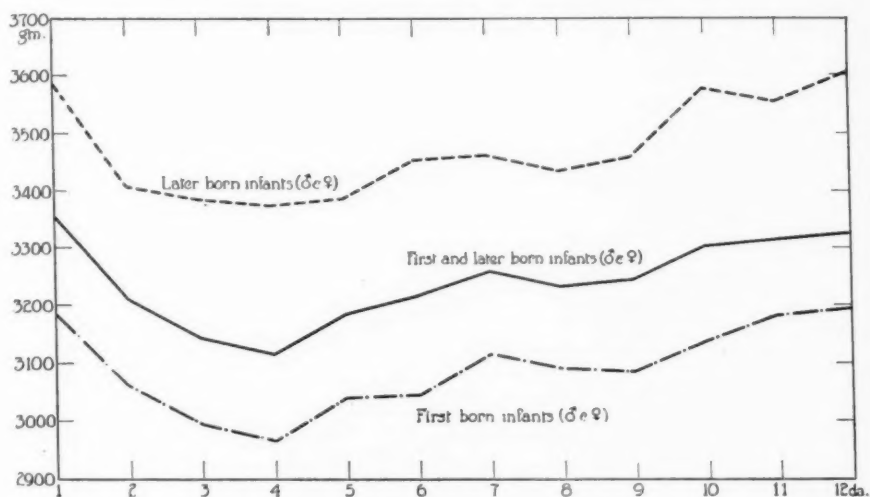
Fig. 5.—Infants' daily weight with mothers on a high protein diet.

They also remark that ''Until recent years it was believed that milk varied in percentage of fat from milking to milking according to the daily feed and care the cow received. We now know that if the cow received sufficient nutrients to maintain her body weight, the percentage of fat cannot be materially altered for any long period of time by greater or less liberality of feeding or by supplying any particular kind of feed.'' ''It is not the body of the cow or the digestive tract, but the glands of the udder which determine the characteristics of the milk yielded by each individual cow. This is what we should expect, for if milk varied with every slight change of food and condition, the life of the young, dependent on such milk, would always be in jeopardy.''

Jordan, Jenter, and Fuller in their studies on the nutrition of milch cows found that ''Over 40 per cent of the available energy value of the rations was used for maintenance, over 30 per cent reappeared in the milk solids, leaving a balance of from one-fifth to one-fourth of the ration. The logical conclusion is that this balance, in part at least, sustains the work of milk secretion.''

They were not able to prove that supplying more or less protein or more or less fat caused material changes in the cow's milk. They did not feel justified in con-

cluding from the experience of others or their own that "The composition of the ration determines to a large extent the character and composition of the milk."

Savage writes that "Investigators and practical feeders alike have found that there is a certain relation between the protein and the carbohydrates and fat in the best rations. This relation is called the nutritive ratio. The ratio is always expressed as the amount of carbohydrates and fat that there is in a given feed or ration compared with one pound of protein." "A feed or ration having a nutritive ratio of less than 1:6 is spoken of as having a 'narrow' nutritive ratio; if the ratio is above 1:6, the ration or feed is said to have a 'wide' nutritive ratio."

Hall and Wheeler from their investigations as to the effect of changes in the feed on the yield of milk concluded that "In general, the milk flow increased most or diminished least when the greatest increase was made in the total amount of digestible food supplied, without regard to moderate changes in protein content; and the most rapid shrinkage in milk yield accompanied the greatest reduction in nutrients. This reduction, however, was usually associated with a reduction of protein." "Changes in the amount of protein, within ordinary limits, produced less effect than changes in the total nutrients." They believed that
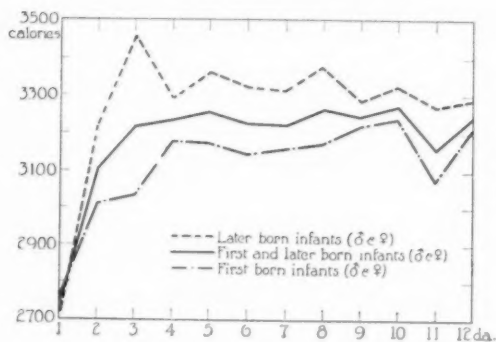
Fig. 6.—Mothers' daily caloric intake when on a high carbohydrate diet.
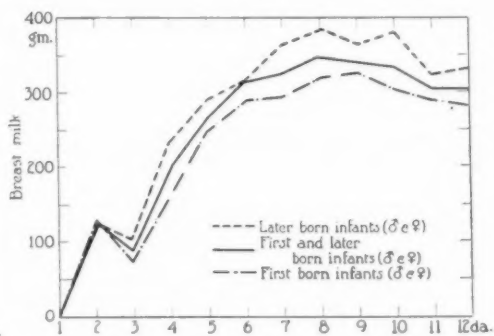
Fig. 7.—Infants' daily breast milk ingestion with mothers on a high carbohydrate diet.

"Changes in the quantity of nutrients has greatly more influence on the milk yield than proportionally large changes in the amount of protein. If the available energy of the ration is sufficient, and is kept at a uniform point, there may be quite a wide range in the nutritive ratio without materially affecting the milk flow."

Hart and Humphrey in a study of the relation of quality of proteins to milk production found that the quality of the proteins was an important factor in the production and maintenance of milk and that the synthetic powers of the mammary gland did not wholly compensate for deficiencies in protein structure. They felt that their work opened anew the problem of the protein requirements for milk production and that it should be studied from the newer angle of protein structure. They found, for example, that milk proteins had an efficiency for milk production and tissue restoration of about 60 per cent, while corn and wheat grain proteins showed an efficiency of 40 per cent and 36 per cent respectively.

In a later investigation they were able to show a decline in the total solids and the total yield of milk after having the cows on a negative nitrogen balance. There was also a marked difference in the utilization of the various concentrates used.

In a later article the same authors pointed out that by maintaining a positive nitrogen balance with a relatively low protein intake, on a ration having approximately a nutritive ratio of 1:8.5, there was a slow shrinkage in milk volume,

but a maintenance of the percentage composition of the milk. They also showed from their work that the utilization and efficiency of various proteins varied according to the way they were used, whether singly or as supplemental to other protein foods. They concluded that "These facts must emphasize in a very striking manner the limitations of any classification of natural foods in respect to the efficiency of their proteins, based on the determination of such nutritive worth in a single food material or a single food mixture."

Kennedy and Dutcher from a study of the influence of the diet of cows upon the amount of vitamines A and B present in their milk decided that the presence of these vitamines in the milk is entirely dependent upon their occurrence in the diet. They further believed that "The effect of the vitamines is not necessarily one of appetite stimulation but rather a stimulation of metabolic processes which promote growth."

Meigs in some very recent work stated that he felt that "The milk secretion is pre-eminently affected through changes in the quality and quantity of the amino-acid mixture circulating in the blood. Such changes are brought about by changes
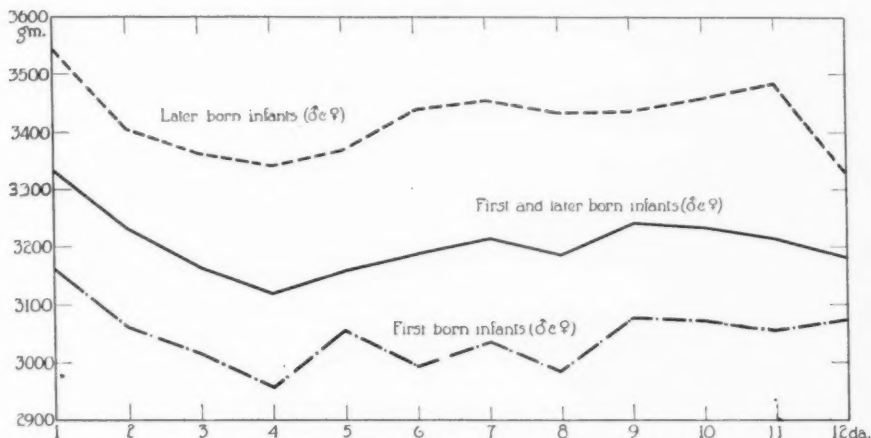
Fig. 8.—Infants' daily weight with mothers on a high carbohydrate diet.

in the quantity or quality of the protein fed, and also by marked changes in the quality of the non-protein portion of the ration. They tend to affect the whole amount of milk yielded rather than the concentration of protein in the milk, though the latter kind of change can easily be detected when the experimental conditions are appropriate. The amino-acid mixture circulating on the blood plasma seems, under certain circumstances, to have an effect on the secretion of milk fat."

"Milk fat is derived from the phosphatid of the blood plasma. Its secretion is probably, to some extent, dependent on the concentration of phosphatid in the blood, and therefore on both the fat and phosphorus supplied in the food." "The results indicate that a shortage of carbohydrate in the food affects the milk yield through changes brought about in the amino-acid mixture of the blood." "The plasma calcium may, therefore, be regarded as the precursor of the milk calcium. The concentration of plasma calcium is extremely constant and largely independent of the food supply. It is not surprising, therefore, to find that changes in the quantity of calcium in the food have no immediate effect on milk secretion."

Insofar as the vitamines are concerned, Meigs felt that the evidence thus far obtained indicates that "changes in the vitamine content of the diet influence

directly the concentration of vitamines in the milk rather than the amount of milk secreted.''

Lusk in a recent edition of his work, ''The Elements of the Science of Nutrition,'' stated that ''The influence of nutrition on the production of milk has been the object of countless investigations, but unfortunately most of these experiments have been conducted for commercial purposes on cows and goats. These animals, with their fundamental ration consisting of hay, do not allow of the ingestion of simple foods. On the other hand, the milk supply of even a large bitch is very limited in quantity and is with difficulty obtained. The writer is not aware of any scientific observation on the composition of human milk as influenced by food, although such researches would seem of great importance.''

The earliest investigation of the effect of diet on milk production and composition which the author of the present paper has been able to find is that of Vernois and Becquerel. They conducted some experiments on women, from which they concluded that the kind of nutriment had little influence upon the com-

Fig. 9.—Mothers' daily caloric intake when on a high fat diet.
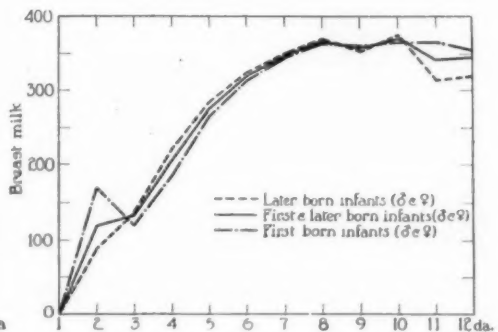
Fig. 10.—Infants' daily breast milk ingestion with mothers on a high fat diet.

position of milk but that the amount of food was much more important. They believed that excessive nutriment increased the output of milk as well as that of casein and fat. They felt that scanty nutriment had an opposite influence.

Pasch from his study of the effect of undernutrition on the fat content of human milk decided that if the mother was in fairly good health moderate undernutrition did not produce a diminution of the butter fat in human milk.

Hoobler in his most important work on the effect of diet on the production of human milk demonstrated some interesting facts. He summarized his results as follows:

1. A nutritive ratio of 1:6 or narrower seems best adapted to the need of nursing mothers.

2. Animal protein is more suitable than vegetable protein in supplying nitrogen for milk and maintenance of nitrogen balance.

3. The protein derived from nuts when fed with other vegetable protein is suitable for supplying milk protein and for maintaining nitrogen equilibrium.

4. A diet composed exclusively of cereals, fruits and vegetables does not supply

sufficient protein for elaborating milk protein and causes a severe drain on the tissues of the mother.

5. Of the various forms of animal protein, that which is derived from cow's milk seems particularly suitable for the production of human milk protein, as well as for the preservation of maternal tissues.

In 1922 I published a joint paper with Dr. C. A. Stewart on "Milk Ingestion in Relation to Changes in Body Weight of Newborn Infants."

There were about 300 cases studied in this work and some basic facts were established in regard to the amount of mother's milk ingested by babies during the first ten days of their lives. The weight loss and increase of these infants day by day was noted. The data established by this study in the Swedish Hospital serve as a basis for the present work, which was done in the same institution.

The present investigation covers over four hundred cases. These cases have been divided into four series according to the diet received by the mother. If we include the older series mentioned above, we are really dealing with five series. In the old series of 298 cases
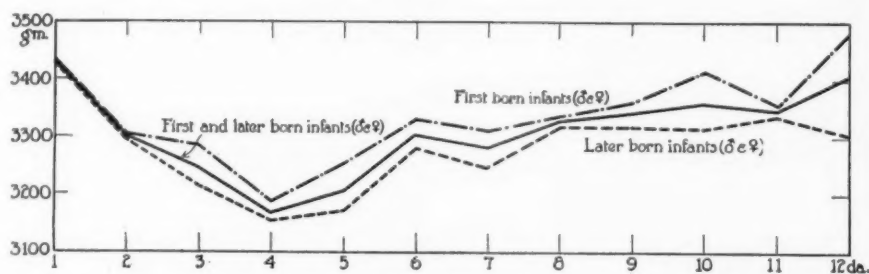
Fig. 11.—Infants' daily weight with mothers on a high fat diet.

the mother was on an ordinary hospital diet, which was not recorded or calculated. The patients were served from the hospital and diet kitchens with no particular regard to more than simple dietary principles. The remaining or present series are four in number and in these the diets were carefully worked out and scrutinized. The exact amount of food taken by the patients with each meal was determined, and also the amount of protein, carbohydrate, and fat was worked out.

The cases have been run in series of approximately one hundred each: (1) High protein diet, (2) high carbohydrate diet, (3) high fat diet, (4) balanced diet. The babies were weighed before and after each nursing to determine the amount of milk taken from the mothers, and if expression was practiced this was added to the amount ingested at each nursing. The net weight of the infant was taken daily.

We have compared the effect of these different diets on the amount of breast milk secured by the babies in the different series, and also the actual weight loss and gain in the babies of the mothers who were

on the different diets. We hoped in this way to secure some valuable information as to the amount of food taken by the different mothers and also the effect of pushing the different food ingredients on lactation.

It seemed to the author that some definite information on this subject would be well worth while, and it seemed possible that some information might be obtained. We hope to be able to show whether or not pushing proteins, carbohydrates, or fats has any appreciable effect on the mammary secretion as shown by the amount secreted or by its effect upon the infant.

In this work there has been no attempt to do any detailed metabolic work upon the mother, and no milk analyses have been done. The

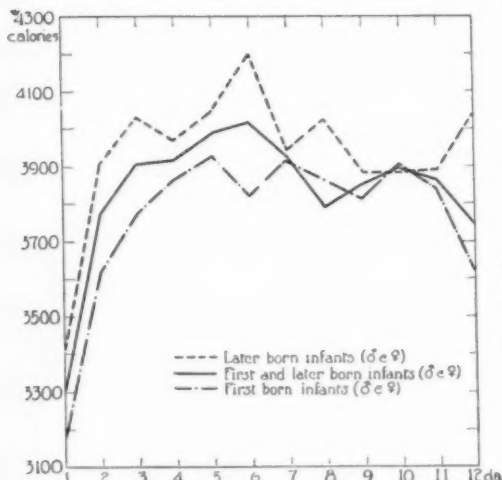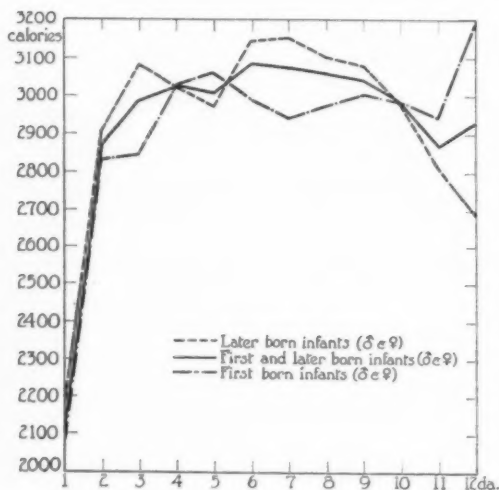
Fig. 12.—Mothers' daily caloric intake when on a balanced diet.
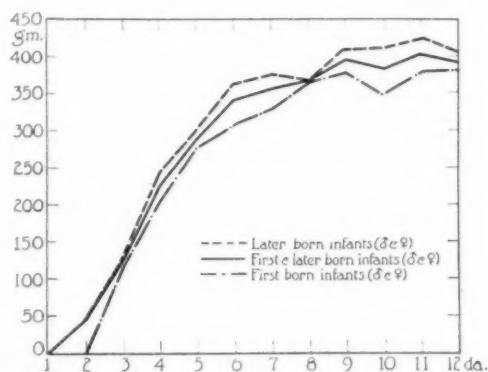
Fig. 13.—Infants' daily breast milk ingestion with mothers on a balanced diet.

study is one based on a rather large number of cases and it is more or less statistical in character. It is not a clinically or metabolically scientific discussion. Accurate but gross methods have been used, and the efficacy of the different diets determined by the results upon the offspring, which is really the crucial test of the value of breast milk from either a quantitative or a qualitative point of view.

There are many factors which influence the amount of milk secreted by the human mother. The most important single factor is probably the individual characteristic of the mammary gland. This is probably best shown by the observation which can be not infrequently made in the nursing mother, that the breast of one side secretes much more than that of the other. The two mammary glands are thus subjected to as nearly identical conditions as it is possible to obtain.

There are many other things which have a great influence on the

amount of milk secreted by a mother, but none of them will stimulate a breast to secrete beyond its individual capacity. Unfavorable conditions tend to keep the secretory activity of the gland below the maximum.

A knowledge of the different things which affect the secretion of milk detrimentally will help us to surround the nursing mother with the optimum conditions and thus secure the most and best milk for the offspring.

It oftentimes becomes a matter of the very greatest importance to obtain from a human mother the maximum milk production. It would many times be desirable to influence the percentage composition of milk. There is very little experimental or other evidence to indicate that we can in any material way influence the quality of a
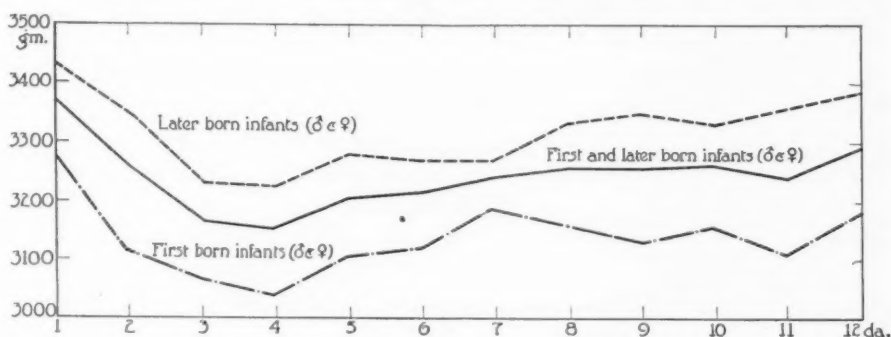
Fig. 14.—Infants' daily weight with mothers on a balanced diet.

mother's milk. On the other hand, there seems to be good reason to think that certain factors tend to depress and others to stimulate the breasts to their maximum production.

We could enumerate some of the conditions which seem to affect the activity of the breasts. The age and parity of the mother have their influence. The physical characteristics and condition have much to do with proper functioning of the milk glands. The same statement is true regarding the psychic characteristics and condition, which would doubtless be particularly true of the human mother. The environment, including hygiene and diet, is without doubt very important. The size and demands of the offspring, together with the manner in which the infant nurses, are of very definite importance in the production of milk. Other conditions surrounding the act of nursing itself depress or promote milk secretion, such, for instance, as pain from sore nipples, or contrariwise, the satisfaction and pleasure which may be associated with a normal act of nursing.

In the present paper we have tried to neutralize these various influences by having relatively large series of mothers under as nearly

the same conditions as possible but varying certain constituents in the diet in rather large groups of mothers. All of the observations were made in the same institution, the Swedish Hospital, Minneapolis, under the supervision of the same personnel. Some of the other factors have been analyzed in the accompanying tables and it can be readily seen how closely they coincide.

The age factor in relation to the parity of the mother and the sex of the offspring for the four diets has been tabulated. The average
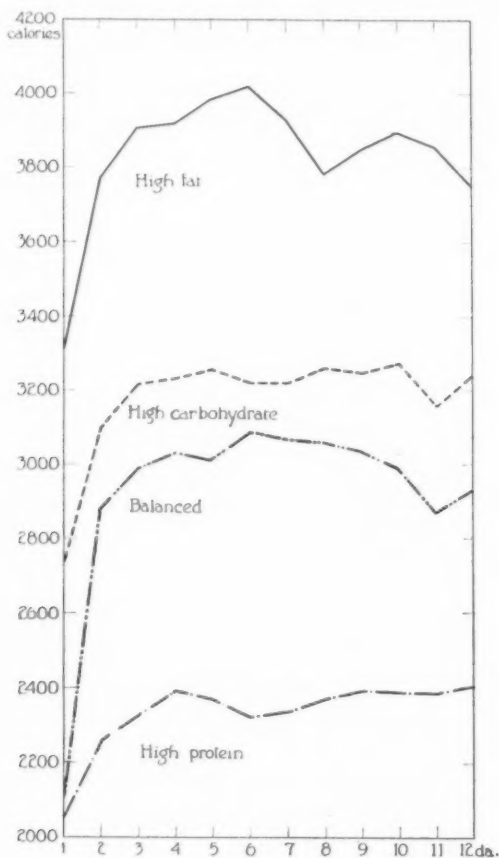
Fig. 15.—Mothers' daily caloric intake for different diets.

ages of the mothers in the primiparous group show very little variation in relation to either the different diets or the sex of the offspring. The maximum and minimum ages also show remarkably little difference in the various groups.

The average ages of the mothers in the multiparous group are naturally somewhat higher than those in the previous group, but run nearly the same for the different dietary and infant sex groups.

It would seem from the data in this table that the age factor in

relation to milk production could be eliminated, inasmuch as the average ages and also the maximum and minimum ages are so similar in the different groups.

The weight of the mothers in the different groups was averaged. The average weights are so nearly alike that it would not seem that there could be much difference in average maintenance requirements of the patients included in the various dietary groups.

It is very interesting to note that with the exception of the first day there was a remarkable uniformity in the caloric intake on the different days. This seems to hold true for all of the diets. Even though the amount taken on the different diets varied greatly, there was a noticeable uniformity in the daily caloric intake on the same diet. It is also noteworthy that in general the average daily caloric intake was somewhat greater among the multiparous than among the
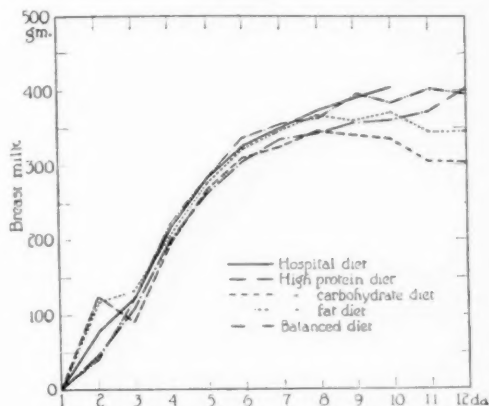
Fig. 16.—Infants' daily milk ingestion with mothers on different diets.

primiparous women. There seemed to be no relationship between the amount of food ingested by the mother and the sex of the infant.

There was a most striking difference in the food ingestion of the mothers in the different dietary groups. The mothers who took a high protein (H.P.) diet had the least caloric intake of any of the mothers. This applies not only to the average for the whole group, but also to the subgroups. The average daily ingestion ran from about 2000 to 2400 calories.

The next larger amount of intake was in the balanced ration (Bal.). The statements made above apply to this diet also, with the exception that the average number of calories taken each day varied from approximately 2100 to 3100. The high carbohydrate (H.C.) diet comes next in line, with the same general statements applying. The average daily caloric food intake ran from about 2700 to 3300. The high fat (H.F.) was greatly in excess of the others in the food value con-

sumed. The average daily amount eaten varied from 3300 to 4000 calories.

It is important to remember that these women were at rest most of the time and were not undergoing any great physical strain, which would, of course, minimize their caloric requirements.

Assuming that the calories necessary for a lactating woman at rest would approximate the needs of an individual at work, one could reasonably believe that about 2400 calories a day would constitute a fairly normal food intake. This should be somewhere nearly correct for women averaging around 132 lbs. or 60 kilos. This food value seems to be more closely attained in the high or liberal protein diet than in the others.

On the high protein diet, a liberal amount of protein was consumed by all of these women, but it is rather striking that the multiparae took more protein than the primiparae, while the other ingredients averaged about the same for all the different subgroups.
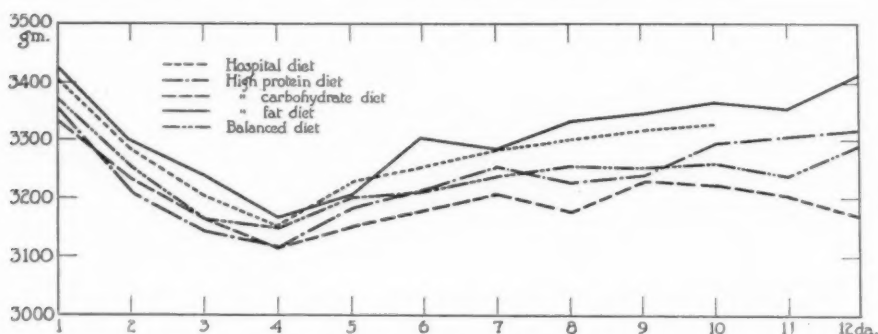
Fig. 17.—Infants' daily weight with mothers on different diets.

In the other three regimes the amount of protein consumed was considerably less than that taken on the high protein diet but the caloric intake was considerably more. In the case of the high carbo-hydrate and high fat diets, it must have exceeded the actual requirements for maintenance and milk production.

Both the high fat and the high carbohydrate diets, especially the latter, seemed to appeal to the patients more than either the balanced or high protein rations. It is difficult to know whether they took an excess of food because it was palatable or in order to secure enough protein to meet their minimum needs. They secured about 80 gm. or 320 calories from their protein intake on these diets as compared with about 107 gm. or 427 calories on the high protein feeding. The average range of caloric intake on the different diets was over 1500 calories from the minimum (H.P.) to the maximum (H.F.). The following ratio might be expressed: H.P. : Bal. : H.C. : H.F. as 23 : 30 : 32 : 39 in reference to the total caloric intake. The amount of

protein taken on these respective diets might be expressed as follows: 42 : 31 : 31 : 33. In the same manner the average caloric value of the fat ingested might be expressed numerically, 85 : 104 : 207 : 132. In reference to the average carbohydrate intake, we might use the following mathematical expression: 107 : 141 : 189 : 152.

While these expressions are not absolutely correct, they enable one to visualize somewhat better the relationships of the various diets.

Observations made relative to the effect of the different diets on the infant as shown by its milk ingestion, weight loss and gain, show that the minimum average weight of the infants occurred on the same day of postnatal life, which was the fourth day. The average birth weight for the different dietary groups was very nearly the same, showing only slight variations.

The initial weight loss was not so very different for the infants of the different groups, being the least among those whose mothers were on a high carbohydrate diet, and greatest for the newborns whose mothers had a high fat diet. The weight losses were as follows for the different groups: H.C. 213 gm., Bal. 225 gm., H.P. 238 gm., H.D. (hospital diet) 255 gm., H.F. 264 gm. In none of the groups did the infants regain the average birth weight within twelve days. It was most nearly regained in the H.F. group, and the poorest gain was shown in the high carbohydrate series. The number of grams short of the birth weight were as follows: H.F. 24 gm., H.P. 32 gm., H.D. (10 days) 75 gm., Bal. 85 gm., H.C. 157 gm.

In so far as the milk ingestion was concerned the H.C. and the H.F. showed the greatest amounts on the second day. Two of the series showed a progressive increase in the amount of milk secreted, namely, the H.P., in which a maximum of 402 gm. was attained on the twelfth day, and the H.D., with 405 gm. on the tenth day. In the other series the maximum was reached earlier and then showed a tendency to decline. The largest amount was reached in the H.C. diet on the eighth day (348 gm.). This gradually fell to 304 gm. on the twelfth day. Those having the H.F. diet secreted an average of 372 gm. on the tenth day and 345 gm. on the twelfth day. The Bal. diet gave 401 gm. on the eleventh day and 391 gm. on the twelfth day.

It is difficult, if not impossible, to draw absolute conclusions regarding the quantitative effect of diet upon the mammary secretion. It is quite obvious that the nursing mothers ate more than necessary of both the high carbohydrate and high fat diets. This was especially true of the latter.

This excess diet had no apparent effect on stimulating milk production. A high caloric feeding might be objectionable in view of the not infrequent observation that rapid increase of weight in nurs-

ing mothers is not uncommonly associated with a decreasing milk supply.

The milk ingestion and weight increase of the infants in the neonatal period would seem to indicate that the milk secretion increases more steadily on the rations which contain a liberal amount of protein. These diets were also mixed and did not run to an excess of any of the ingredients.

The hospital, high protein, and balanced diets seemed to meet the needs of the mother and infant, without excessive caloric intake, better than either the high fat or high carbohydrate diet.

This is not in accord with common practice in relation to the pushing of certain types of feeding in nursing mothers. Certain later observations of a clinical and empirical nature on some of these mothers led both Dr. C. A. Stewart and the author to feel that liberal protein feeding is of definite value in securing the maximum milk supply from these nursing mothers.

This work was done in the Swedish Hospital of Minneapolis and the author is deeply indebted to many of the members of the hospital staff and especially to the dietitians, Miss Juanita Kelley and Miss Irene Dahl.

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LA SALLE BUILDING.

BLOOD-STREAM INFECTION TREATED WITH MERCURO-CHROME 220 INTRAVENOUSLY*

By Edmund B. Piper, M.D., Philadelphia, Pa.

TWO years ago before this Society, I presented a report of animal experimentation and clinical work on the chemical disinfection of the blood.† Having accepted the responsibility of injecting mercurochrome intravenously for therapeutic purposes, following properly controlled laboratory and animal experimentation, I am now presenting data to show that the originally described principles and practice have been followed essentially unchanged. I wish to present the limitations of the above and to report certain failures and successes. Minor details of variation in administration and dosage will be noted.

The conclusions of my original paper were as follows:

1. There are certain cases of puerperal septicemia so fulminating and virulent that no treatment can possibly save them.

2. The use of antistreptococcic serum has appeared to be of great value in some cases. Frequently repeated small blood transfusions are of value, as apparently are other methods of intravenous medication.

3. A solution of mercurochrome given intravenously in the proper dosage appears, in some cases, to be of great value and to have no deleterious effects.

4. All cases of puerperal septicemia are so serious and so frequently fatal that heroic methods are justified.

The question arises as to whether or not, following a much larger clinical experience, the conclusions arrived at two years ago are justified at the present time. As far as the use of mercurochrome intravenously in blood-stream infections is concerned, I would say that my increased clinical experience makes it impossible for me to subscribe to the last part of the original conclusion, Number 3., i.e., that a solution of mercurochrome has no deleterious effects. Since that time I have seen two cases and one other has been reported to me in which ill effects have been noted. Whether these should be attributed to the drug or to the severity of the infection it was impossible to determine. However, if these effects were not reported we feel that we would not be doing our full duty.

Regarding the change in the dosage,—in the original paper we recommended 25 c.c. of a 1 per cent solution of mercurochrome in distilled water for every 125 pounds of body weight. This we believed to be

safe at the time, and still do so, but in order to procure higher germi-
cidal activity within the blood stream the dosage was increased to 30
c.c. for every 100 pounds of body weight. It was during this period of
increase that one of the ill results occurred.

We have now arrived at a somewhat different method of administra-
tion.* In cases that are not *in extremis* but with positive blood cultures
we proceed in the following manner. An initial dose of from 20 to 30
c.c. of a 1 per cent solution is given depending upon the weight of the
patient. This dose is not intended to be in any way curative but is
given primarily to observe the action on the kidneys. If, following this
first dose, there is no apparent decrease in the excretory functions of the
kidneys, nor increase in the evidence of acute nephritis, we proceed to
use what we now consider the maximum dose. This is estimated as
30 c.c. for the first 100 pounds of body weight and 5 c.c. additional for
each 30 pounds above the first 100 with a maximum dose of 45 c.c.
for anyone beyond the 200 pound mark. Naturally this matter is some-
what one of guesswork as all these patients are much too ill to get their
exact weight. Furthermore it is merely a working rule and I should
have no hesitancy in exceeding this dosage under certain conditions.

In a recent number of the *Journal of the American Medical Associa-
tion,* two cases of ptyalism are reported following the intravenous use
of mercurochrome. I would call attention to the fact that the danger
of this condition was mentioned in my orginal paper. It was suggested
to me recently by one discussing this method of treatment that all the
reaction that occurred was due to mercury poisoning. We had always
surmised this to be the case, at least to a great degree, but we felt
there was a basis for our hypothesis that some of the chill and rise in
temperature might be due to the destruction of microorganisms within
the blood stream. This has been borne out in a considerable number
of cases. We observed that there was very slight reaction in those
cases in which we suspected blood-stream infection, but which subse-
quently showed no microorganisms in the blood cultures taken at the
time of the injection. Our results have varied with the different types
of microorganisms shown to be present. They have been good for the
staphylococcus and for the streptococcus hemolyticus and nonhemolyticus.
The drug in my hands has been utterly useless in the streptococcus
viridans. Experimentally it has been of slight value in the pneumo-
coccus.

As stated in my original report on the subject, mercurochrome origin-
ated in the clinic of Dr. Young of Baltimore and was there used ex-
clusively in the genitourinary tract and for other local infections. Fol-
lowing my presentation of the experimental and clinical work of this
drug, at the request of Dr. Young in May, 1922, I read to him and his

*"Treatment of Puerperal Septicemia," Edmund B. Piper. Surgical Clinics of
North America, February, 1924.

staff in Baltimore the original article presented before this Society the week before. Since that time Dr. Young, having adopted this method of treatment, has reported before various societies and in numerous publications his subsequent results, which have been most encouraging. A most interesting fact in Dr. Young's report is that he has been able to treat successfully certain local conditions such as pyelitis and perinephritic abscess through the intravenous use of mercurochrome. It may be remembered that in my original paper one case of pyelitis was reported as symptomatically cured. We did this to see what merit there might be in intravenous use for local conditions and since then have had some successes but more failures.

Dr. B. C. Hirst is reporting 17 cases in which the drug has been used intravenously in streptococcic infections in the puerperium. The recoveries in this series will approximate 45 per cent. This includes the moribund and unconscious. Dr. Alfred Stengel, Professor of Medicine at the University of Pennsylvania, is reporting five cases, two of which were staphylococcic blood-stream infections.*

As this report is in no wise a statistical one I feel at liberty to append herewith a few cases which have been of unusual interest. These will include not only successful but decidedly unsuccessful ones.

CASE 1.—Dr. Carl V. Vischer†, of Philadelphia, on August 21, 1923, was infected by a needle prick while operating in the Hahnemann Hospital. August 27, infection incised, very little, if any, pus found. August 30, admitted to the Hahnemann Hospital. Culture from wound showed the staphylococcus aureus; finger was further drained. Temperature, 105° F. I saw the patient at this time and ordered 30 c.c. of a 1 per cent solution of mercurochrome intravenously.

Apparently very little of this got into the vein as all of the tissues in the vicinity were discolored by the dye. Temperature, 106° F., very slight reaction. September 5, 25 c.c. of mercurochrome intravenously. Chill in one hour. Temperature 104° F., pulse 140. September 6, reaction was subsiding. September 8, blood culture was negative for 24 hours, one or two colonies at end of 48 hours. September 9, arm incised at the point of the orginal injection of mercurochrome and considerable pus found. September 14, 30 c.c. of mercurochrome intravenously. Good reaction. Temperature 105° F. September 21, blood culture sterile. From this point patient acquired various local infections, one being a prostatic abscess. He was discharged December 12 in fair condition. I have talked to him within the past week and find he has been at work for some months but still has some trouble at the original focus of infection and with his prostate. He appears to be well on the road to complete recovery.

CASE 2.—Mrs. X. Patient living in near-by town was seen by Dr. Nicholson in consultation, who the following day asked me to see her with him. She had been delivered in a hospital where there had been some previous cases of sepsis. Her blood stream showed the hemolytic streptococcus and she was apparently fatally ill. Her abdomen was somewhat distended, she was very drowsy and her respirations moderately rapid. As she presented the characteristics of a fatally ill patient I gave her 45 c.c. of a 1 per cent solution intravenously. There was a

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*The reports of Doctors Hirst and Stengel are not yet published but will be in the near future.

†Dr. Vischer has given me permission to use his name in this case.

marked reaction and the following day she seemed much improved. However, she developed anuria and died about 48 hours after the injection. It is my belief that nothing would have saved her, but our present method of administration, namely, smaller dosage for the first dose, would, at least, have removed the stigma of an apparent mercurial poisoning.

CASE 3*.—Man about forty years old, admitted to the University Hospital in the Medical Service. He was comatose and had all the symptoms of meningitis. Some days previous to his admission a lumbar puncture was done in some other hospital which was the apparent cause of the condition. A lumbar puncture done on admission showed the cerebrospinal fluid to be loaded with staphylococci; in fact the material was almost pure pus. An attempt was made to wash out the cerebrospinal canal through the cisterna magna with mercurochrome. This was found impossible, however, owing to the thickness of the pus. Considering the case to be utterly hopeless, 30 c.c. of a 1 per cent solution of mercurochrome were injected into his veins. A lumbar puncture done 24 hours later drained off a much thinner fluid stained by the dye of the injection. He regained consciousness within 48 hours and went on to a permanent recovery.

CASE 4.—Undergraduate student of the University of Pennsylvania admitted to the student's ward with a staphylococcus blood-stream infection due to a primary infection in his thigh. After two doses of mercurochrome his blood stream was found to be sterile. He had a long, tedious convalescence, was treated surgically and eventually recovered.

CASE 5†—Patient, Mrs. T. Y. admitted to the University Hospital, September 20, 1922. Three weeks previous to admission was delivered of a normal child without difficulty. Two days after delivery she had severe pains in both iliac regions. These subsided and recurred with greater severity. On admission to hospital a blood culture was taken September 21 which showed nonhemolytic streptococcus. September 25 she received 27 c.c. of a 1 per cent solution of mercurochrome. She had a well marked reaction of the usual type. As this case appeared to be in a desperate condition, although her kidneys were functioning well, an innovation in treatment was decided upon. Twenty-four hours after the initial dose she received an injection of 15 c.c. which was followed by a slight reaction. A blood culture taken October 5 was sterile. At this time localization formed in Douglas' culdesac. This was opened and drained from below and the patient made an uneventful recovery. The idea in this particular case was that, estimating the maximum dose to be excreted in 48 hours, we hoped to prolong the activity of the drug by repeating one half the dose in twenty-four hours.

The marked success of this method would warrant its consideration, but I am convinced that it is more dangerous, unless in experienced hands. I could report other cases of success and failure: one, in which anuria occurred in a moribund case, others in which the blood stream was sterilized according to the laboratory reports, but the patients died. But as I am limited as to time and as there will be other papers in which more detailed reports will appear, I wish to confine myself more to a general discussion of this method of treatment.

Dr. Herbert Fox, director of the William Pepper Laboratory of the University of Pennsylvania, has authorized me to quote him as saying

*This case is being reported by Dr. Stengel in greater detail.

†This case is included in Dr. Hirst's forthcoming report.

that before the intravenous use of mercurochrome was instituted, he personally had never seen a case of staphylococcic septicemia recover. In the two cases just quoted above and in two cases that Dr. Stengel will report, we have a total of four cures in staphylococcic septicemia. Dr. Young has reported others, although he himself thinks that gentian-violet used intravenously is of greater value in this type of infection. It must be borne in mind that when these cases recover there is not a miraculous and sudden return to life from a moribund state. Success depends upon repetition of dosage and accurate observation of fluid intake and urinary output. The state of the kidneys is always the determining factor upon whether or not the drug should be repeated. The decision as to when a second or third dose should be given, is dependent upon the cessation of diarrhea and disappearance of urinary discoloration.

In closing I wish emphatically to state:

1. At no time have we considered this method of treatment to be infallible.

2. If the drug is to be used successfully, early diagnosis through blood culture must be made.

3. We are satisfied that lives have been saved by this method that would have been lost by the ordinary accepted medical and surgical treatment of septicemia.

4. We do not believe that this method of treatment is by any means the last word in these conditions, but we do believe that it is a step in the right direction and we hope that some investigator will be able in the near future to find the ultimate cure.

5. We cannot too strongly impress upon the profession that in spite of reports of brilliant recoveries, this is undoubtedly a dangerous procedure and is only warranted by the severity of the condition with which we are confronted. Its promiscuous use is to be discouraged as this will unquestionably bring whatever merit the treatment may possess into definite disrepute.

1936 Spruce Street.

UNRUPTURED INTERSTITIAL PREGNANCY, WITH ANATOMIC AND HISTOLOGIC REPORT OF AN EARLY CASE*

By Jennings C. Litzenberg, B.S., M.D., F.A.C.S., Minneapolis, Minn.

(From the Department of Obstetrics and Gynecology, University of Minnesota.)

ALTHOUGH the interstitial variety is the rarest form of ectopic gestation, many references have accumulated, but the histology and finer anatomy have been given much less attention than the gross anatomy and clinical features. Only Leopold,[1] Ulesko-Stroganowa,[2] Rashke,[3] and Erna Glaesmer[4] have adequately studied these finer phases of the condition. Therefore, when this unusual specimen was acquired, we decided to study it by means of serial sections made of the entire specimen, as was done in our previous work, "Microscopical Studies of Tubal Pregnancy."[5] The large sections of the whole organ give opportunity, not only for comparative histologic study not afforded by the usual "block" sections, but all anatomic relations are preserved, thus permitting the complete following out with the microscope, of some of the more minute anatomic structures, which is difficult or impossible by dissection.

This study is based upon gross appearance and microscopic findings in 427 serial sections made of the body of the uterus containing an interstitial pregnancy.

For the specimen we are indebted to Dr. Frederic Souba of the Department of Obstetrics and Gynecology, University of Minnesota, who removed the body of the uterus after making the diagnosis of interstitial pregnancy. The patient was forty-two years old, the mother of two children and her menstruation was always regular. She sought advice on account of skipping her menstruation twelve days. She had "spotting" but no bleeding and there was no pain. Dr. Souba reported that she was very slender and easy to examine— "almost like one were holding the uterus in his hands."

Some of the types described by the older authors were based on unsound conclusions and are unfortunately perpetuated in textbooks and the literature.

The type described as being entirely surrounded by the interstitial tube is a myth and the so-called "tubouterine pregnancy" is probably quite as fanciful; even Carus,[6] who recognized it in his classification, admitted it had not been definitely proved. In this type the implantation is supposed to be so near the uterine ostium that the pregnancy

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*Read at the Forty-ninth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 15, 1924.

eventually becomes intrauterine, but no well authenticated case has been described.

All the "tubouterine pregnancies" reviewed by Henning[7] in 1889 were later declared apocryphal by Werth,[8] who also discredits the well-known case of Eiermann.[9] We have critically analyzed the case reported by Scott in 1911[10] and, to say the least, believe it is doubtful. Scott's description of the tumor found in one horn of the uterus does not conform to the universally recognized facts established at operation and postmortem. With the exception of these very doubtful cases this type of interstitial pregnancy has never been seen, so the only justification for assuming that it may occur is the purely theoretical possibility. Even the few instances, sometimes cited as evidence, like the cases of Braxton-Hicks[11] and Mashka,[12] in which the fetus was aborted and the placenta afterwards found in the uterine wall, were not "tubouterine," but interstitial pregnancies in which the fetus was aborted by the rupture of a septum between the pregnancy and the uterine cavity. Inasmuch as there are no accredited cases of "tubouterine pregnancy" it is high time that this mythical type be dropped from our textbooks or at least relegated to the realm of unproved theories.

The so-called "uterotubal" type occurring near the distal portion of the interstitial tube bordering the isthmus also seems possible but Werth[8] declared that he found anatomic foundation only for the true interstitial type.

The confusing older classifications should be displaced by the following simple but quite adequate one of Erna Glaesmer:[8]

Type I, The ovum develops in the fundus musculature of the uterus.
Type II, The development occurs in the side wall of the uterus.
Type III, The development occurs toward the isthmus tubae.

Our specimen, under this classification, belongs to Type I, and may be described as follows:

GROSS ANATOMY

The specimen consists of the body of the uterus containing an interstitial pregnancy in the fundus and left cornu. It is an illustration of the usual behavior of an early Type I, interstitial pregnancy in which there is on one horn of the uterus a hemispherical elevation attached by a broad base and pointing upward, outward (Fig. 1) and backward (Fig. 2). This direction of growth is accounted for by the normal course of the interstitial tube which is not directly outward from the uterine cavity to the free fallopian tube but according to Henle[13] and Farre[14] "describes an arc slightly convex upward at the same time approaching the posterior surface of the fundus." Inasmuch as implantation usually takes place at the "angle" of this eccentric course of the tube it must be an etiologic factor.

In our case the implantation occurred at the "angle" where the tube is nearest the posterior surface of the fundus. Quite naturally, growth takes place in the direction of least resistance (Figs. 1 and 2).

The thicker portion of the hypertrophied uterine wall offers considerable resistance while the thinner part stretches to a marked degree of thinness under the influence of the growing ovum or, as in our case, from the pressure of marked hemorrhage. The round ligament is seen arising mesially to the tumor, a valuable differential diagnostic point between interstitial and rudimentary horn pregnancy in which the round ligament is lateral to the tumor.

Another diagnostic point is the broad base of the tumor as seen in Fig. 1. The upward inclination of the fundus toward the tumor is also quite characteristic and was erroneously thought by Ruge and Simon to be pathognomonic of interstitial pregnancy as distinguished from a myoma or rudimentary horn pregnancy (Fig. 1).

The free portion of the fallopian tube comes off from the tumor of the interstitial
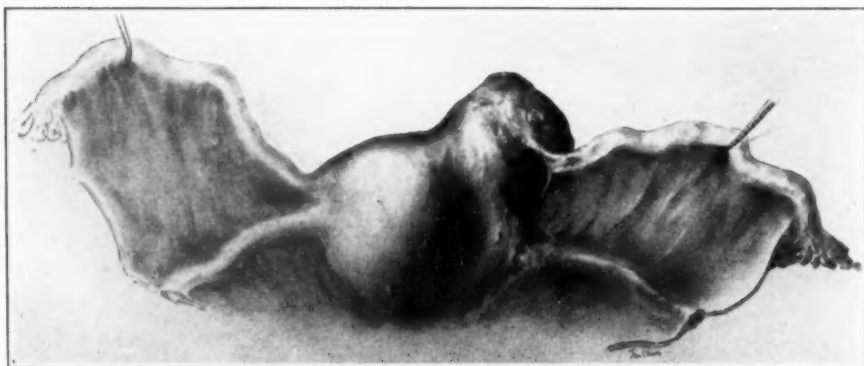
Fig. 1.—Interstitial pregnancy, Type I, probably less than three weeks old. Note height of fallopian tube on tumor, mesial origin of round ligament, inclination of fundus toward tumor, broad base and upward and outward growth of tumor.
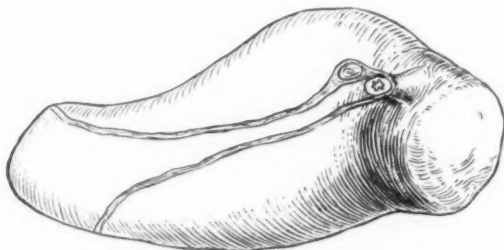
Fig. 2.—Illustrating backward as well as upward and outward growth of interstitial pregnancy tumor.

pregnancy a little below its summit, (Fig. 1) forced to this elevation possibly by the growth of the ovum, but principally by the mass of hemorrhage within the ovum capsule. By comparison with the opposite side it will be seen how far the tube has been forced upward (Figs. 1 and 3) which could not occur without great stretching or rupture of the tube. With the microscope we found that the tube was torn asunder.

The Uterine Muscle.—The uterine musculature participates in the growth process induced by pregnancy earlier and to a greater degree than in any other form of ectopic gestation. Ruge, Werth, Banal and Webster assert that the increase in thickness of the wall of the uterus is more pronounced on the pregnant side, particularly just below the ovum bed. In our case the uterine wall on the pregnant

side ranged in thickness from 1.99 cm. to 2.5 cm. and on the nonpregnant side from 1.2 cm. to 2 cm. (Figs. 3 and 4). The average thickness of the muscular wall on the pregnant side was 2.22 cm. (Fig. 5) and on the nonpregnant side 1.55 cm.

MINUTE ANATOMY AND HISTOLOGY

The Interstitial Tubes.—The proximal portion of the intramural tube on the pregnant side occupies relatively the same position in the uterine wall as does the opposite tube (Fig. 3). The diameter of the normal canal, according to Waldeyer[15] is one mm. at the uterine end and Werth says it varies from one to one and a half mm. throughout its whole length. Our nonpregnant interstitial tube (Fig. 5) measured 1.5 mm. at the uterine ostium, one-half mm. at the "angle" and it gradually increased in size as it approached the isthmus tubae. Its measure was
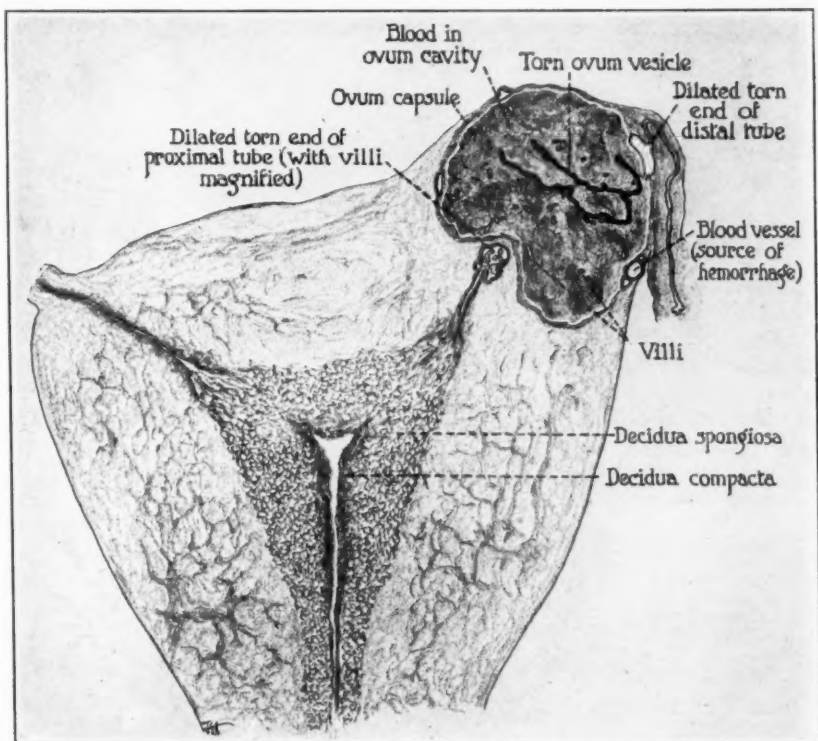
Fig. 3.—Composite drawing of various serial sections brought to one plane. All parts natural size except villi in dilated, proximal portion of tube, which are magnified.

the same at the uterine ostium as the opposite tube (1.5 mm., Fig. 6) and remained the same until it reached a point just below the ovum capsule, where it suddenly became much larger, 3 mm., dilated undoubtedly by the growing ovum before the rupture, for we found several villi in this dilated portion (Figs. 3 and 6).

Immediately above this point the tube suddenly disappears, but after a prolonged search through many slides we observed the torn end of the tube. The normal tube ending in the dilated torn portion had the appearance of a tiny funnel (Figs. 3 and 6). To locate the other torn end was a much greater task, in which we did not succeed until we began at the isthmic portion and traced it with the microscope toward the ovum capsule. At this junction we were rewarded by finding a similar,
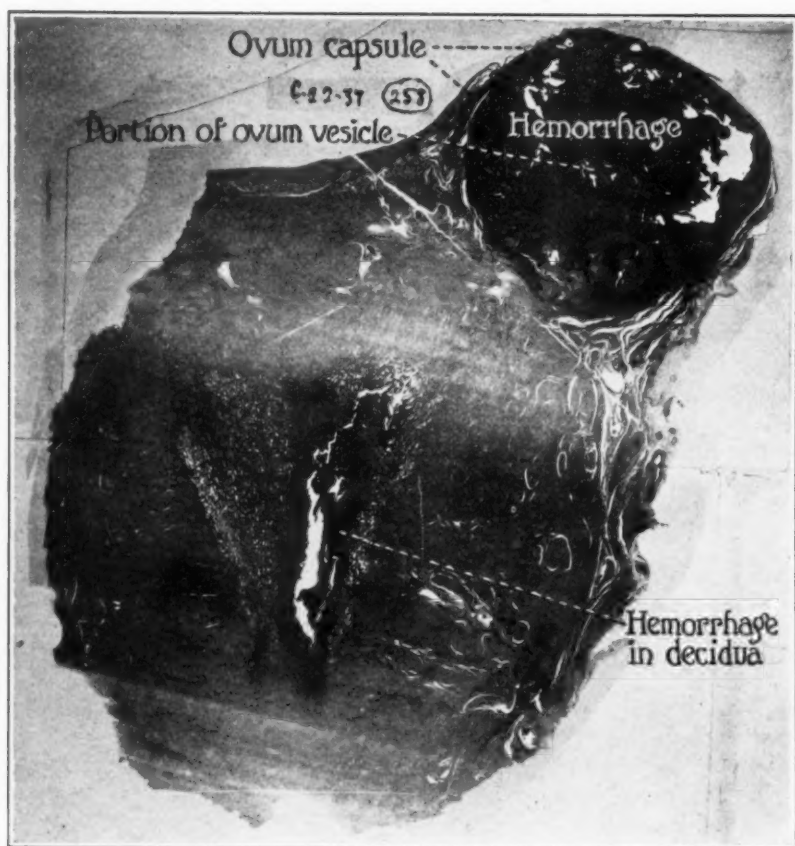
Fig. 4.—Photograph of one of the serial sections, natural size. Note marked hemorrhage in ovum cavity, split uterine muscle constituting ovum capsule very thin at the summit of the tumor; also true decidua with hemorrhage in it and greater hypertrophy of uterine wall on pregnant side.
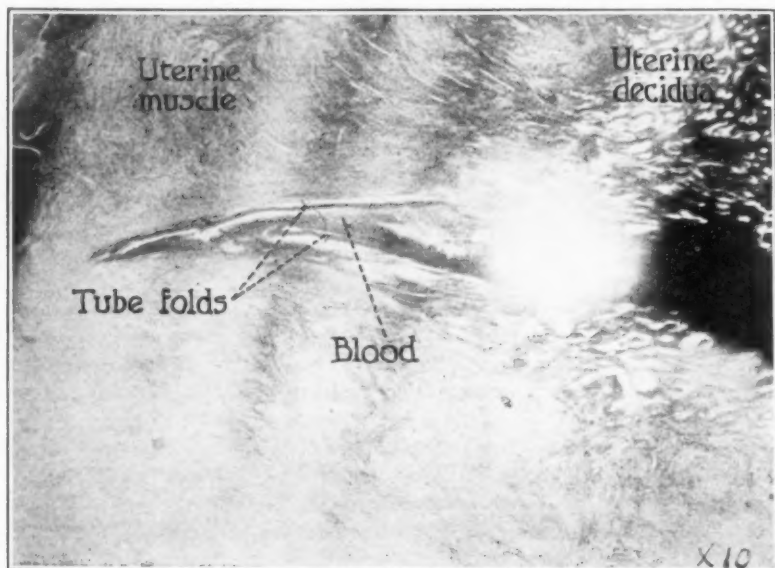
Fig. 5.—Microphotograph of portion of nonpregnant intramural tube magnified ten times.

though larger, funnel-shaped termination at a point corresponding to the origin of the free tube near the summit of the tumor. This proved to be the other torn dilated end of the interstitial tube (Figs. 3 and 7). This dilated portion was somewhat flattened, measuring 3 by 4 mm. Immediately after entering the musculature of the ovum capsule the tube suddenly decreased in diameter to 0.15 mm. (Fig. 7), (microscopic measurement), gradually increasing as it approached the isthmic portion, where it measured 0.95 mm. The extremely narrow lumen within the ovum capsule is undoubtedly due to the very great stretching of the muscle by the distention.

In the small number of cases hitherto investigated tubal canal remnants of varying lengths have been observed in the ovum capsule wall, but so far as we have been able to find in the literature the interstitial tube has not been traced, in so early a case, completely from the uterine cavity to the free fallopian tube, probably because the investigators have not had the opportunity of studying the entire body of the uterus with the contained pregnancy in serial sections.

In Sidney Harvey's case[13] "several groups of mucous glands (!) were found in the muscular wall." These were, probably, sections of the tube. Rashke[3] also found in the lateral muscular wall of the ovum capsule well preserved tubal mucous membrane and Leopold[1] found cavities lined with cuboidal epithelium.

We found similar cavities lined with undoubted tubal epithelium which prompted us to follow them out in serial sections and discovered that they were portions of the tortuous, interstitial tube distal to the pregnancy and which we were able to reconstruct from the isthmus tubae to the ovum capsule as seen in Figs. 3 and 7.

Ulesko-Stroganowa[2] in his three weeks' old case found no communication between the interstitial tube and the ovum capsule, while in our specimen, approximately the same age, we found both the proximal and distal portions of the tube entering directly into the ovum cavity (Figs. 3, 6 and 7). Werth[8] says "While the part of the tube leading to the ovum capsule from without could be followed in the more exactly investigated cases either to the ovum bed or to the ovum periphery the investigators succeeded more rarely in finding the remnant of the tube leading from the uterus to the ovum." Doran[16] and Muret[17] succeeded in this. The folds in the interstitial tube are low, rather wide, extend longitudinally without convolutions, possess very little connective tissue (Figs, 5 and 6) and are covered with high cylindrical epithelium.

Farre[14] found a gradual transition from tubal to uterine type of mucous membrane and said that glands were found in the tube just outside the funnel-shaped entrance to the uterine cavity. In our case the transition from tubal to uterine epithelium was gradual but we found no glands beyond the uterine ostium. While the independence of the muscularis of the interstitial tube from the uterine muscle is distinguishable we found considerable interlacing with the outer tubal layer and Werth asserted that the independence holds true only for the submucous longitudinal layer, first described by J. Whitridge Williams.[18]

The Ovum Cavity.—The ovum cavity lies entirely within the musculature of the uterus, the fibers over the tumor being greatly stretched and thinned. The ovum capsule measures 8 mm. in thickness at the ovum bed or base of the tumor and 0.75 mm. at its summit (Figs. 3 and 4).

The ovum cavity itself measures 2.3 cm. in diameter and is filled with blood surrounding the ruptured and distorted ovum vesicle (Figs. 3 and 4). Scattered throughout the clotted blood numerous detached villi were observed; villi were also seen in contact with the ovum capsule, in some places they had eroded their way into the capsule and blood vessel walls (Fig. 8). Almost the entire cavity is lined with syncytial and Langhans' cells which are also found in the muscular layer, especially in the intramuscular connective tissue and they may be demonstrated
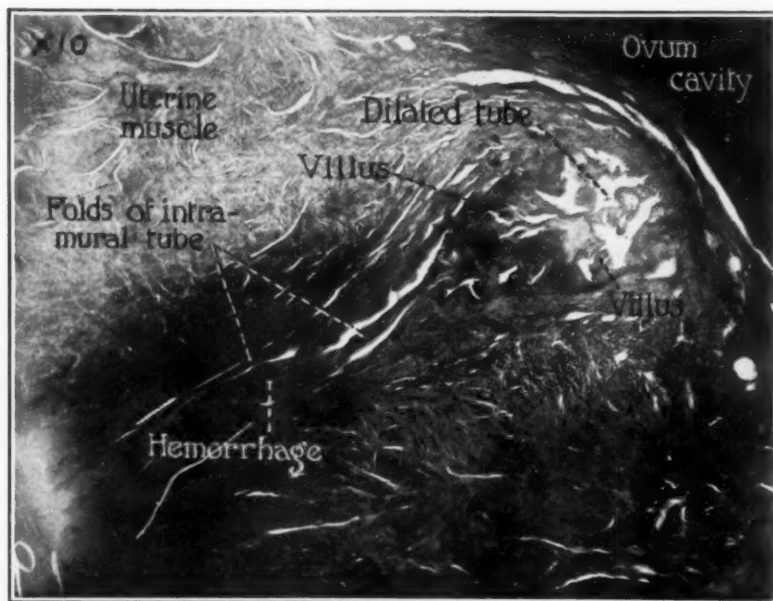
Fig. 6.—Microphotograph of part of proximal portion of pregnant intramural tube magnified ten times. Note tube dilated by ovum before rupture into present ovum cavity in uterine muscle, also note villi in dilated funnel-shaped portion.
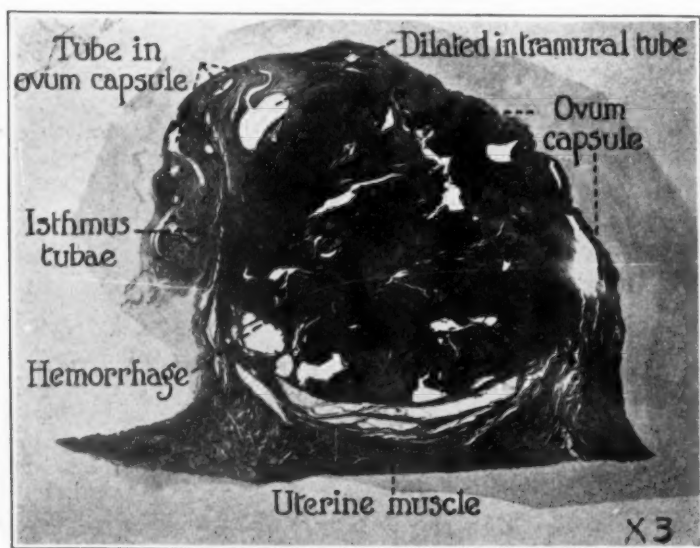
Fig. 7.—Photograph enlarged three times showing distal portion of ruptured dilated tube with intramural tube running from it through the ovum capsule to the isthmus tubae. This dilatation was originally united to the dilated portion of the proximal tube shown in Fig. 6. They are now torn asunder and forced 3.4 cm. apart by the hemorrhage.
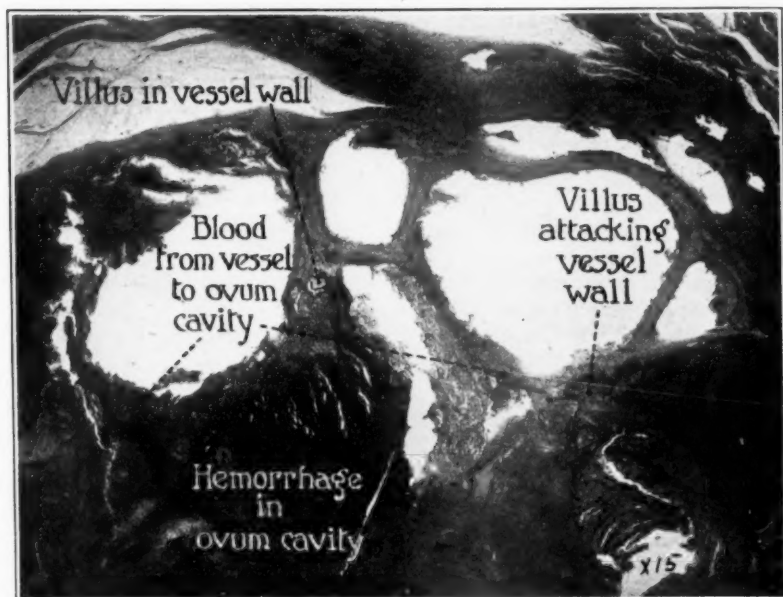
Fig. 8.—Photomicrograph of cornual vessels magnified fifteen times, showing vessels eroded by villi.   Note villi in and attacking vessel walls, also blood flowing into ovum cavity.
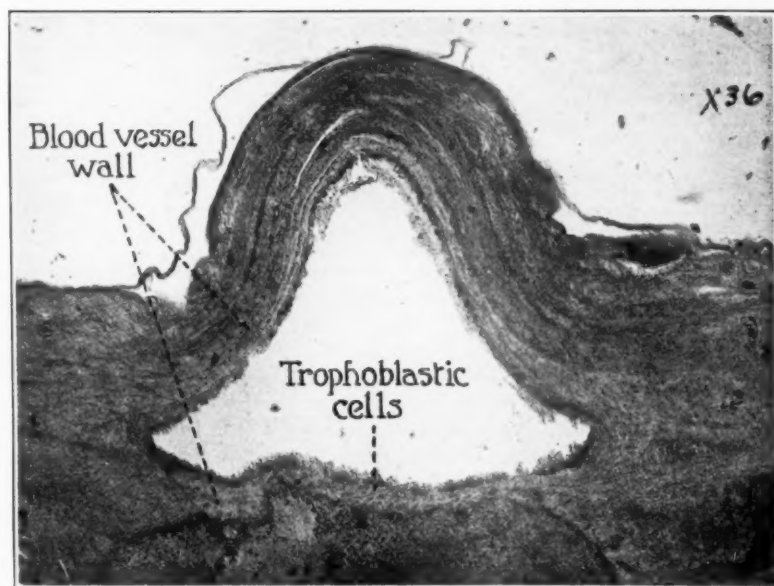
Fig. 9.—Photomicrograph magnified thirty-six times, showing trophoblastic cells in wall of vessel next to ovum cavity but none in opposite wall.

in the vessel walls. Figs. 9 and 10 show this infiltration in the wall of a vessel on the side next to the ovum with entire absence in the wall opposite.

The Decidua.—The endometrium in our case varies in thickness from 5 mm., nearest the internal os, to 9.5 mm. in the fundal region. In general appearance it is a perfect counterpart of normal uterine decidua (Figs. 4 and 11) except that it is in places hemorrhagic and some of the cellular elements, particularly in the glands, are in a state of regression.

The decidua is composed of compact and spongy layers and the decidual cells present the familiar mosaic appearance of normal decidua together with large numbers of lymphocytes.

The glands in the spongy layer are wide, in some places flattened, especially where hemorrhage within the decidua has compressed them (Fig. 4).

The epithelium of the glands is still present but seems to be in a marked state of degeneration both grossly and microscopically. Here and there it covers the
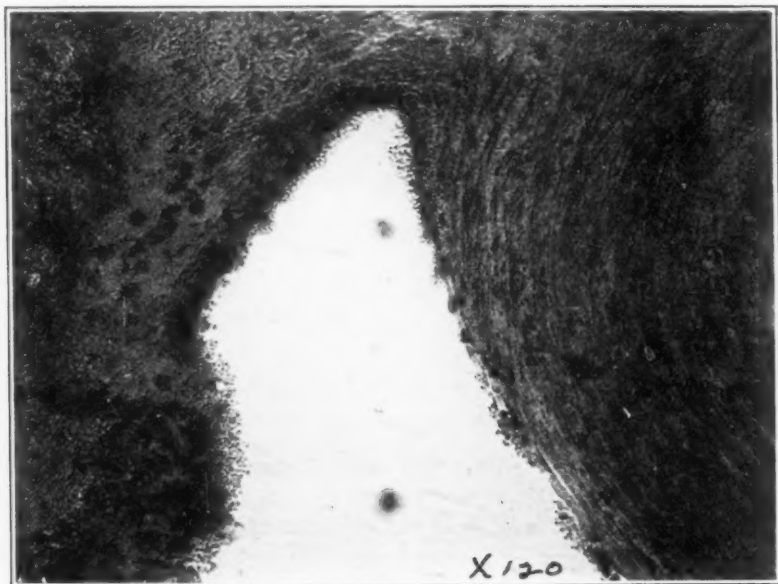
Fig. 10.—Photomicrograph of the same vessel as shown in Fig. 9 under higher power, magnified one hundred twenty times, showing same trophoblastic cells on ovum side and none opposite.

glands normally but it is loosened and irregular in many areas and nearly all of the glands contain shed intact epithelium and débris of broken down epithelial cells (Fig. 11) containing round bodies which Werth[3] thought might be hyaline degeneration. The epithelium gradually becomes less columnar as the surface of the decidua is approached, being quite flat at the mouths of the glands.

According to Samson[17] the compact layer of the uterine decidua, in early tubal pregnancy, constitutes about one-fifth of the decidua vera.

In our specimen the relative proportion of compacta and spongiosa varies as the fundus is approached, the proportion of compacta to spongiosa varying from approximately one-sixth to one-fourth of the decidual membrane (Figs. 3 and 4). The spongiosa lies between the compacta and the uterine musculature to which it is attached by tiny bridges of tissue carrying blood vessels and it is composed of enlarged glands of varying shapes according to the direction of cutting (Figs.

3 and 11). In some areas the glands look like flattened elongated tubes, espe-
cially in the neighborhood of hemorrhages within the decidua by which they appear
to be compressed (Fig. 4). There is very little stroma between the glands and
therefore relatively few decidual cells as compared to the compacta.

Decidua Outside the Uterine Cavity.—The perennial discussion of the occurrence
of decidua other than in the cavity of the uterus would be greatly simplified if the
distinction were always made between "true decidua" as a tissue or organ and
"decidual reaction" in the form of decidual islands or isolated cells.

In sense of "true decidua" it is the consensus of opinion that it does not occur
in tubal gestation outside the uterine cavity and that "decidual reaction" is fre-
quently found elsewhere.

We find the same is true in interstitial pregnancy. We were unable to find either
undoubted decidual islands or even decidual cells anywhere within the ovum sac.
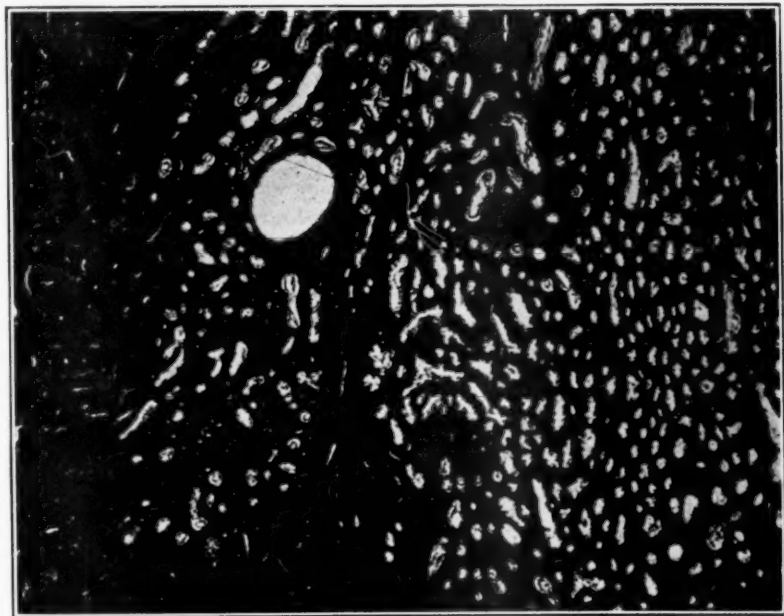
Fig. 11.—Photomicrograph magnified twenty times showing true decidua of uterine
cavity. Note dilated vessel and degenerating epithelium and débris in glands.

Leopold,[1] Ulesko-Stroganow,[2] and Erna Glaesmer,[4] who have made the most
extensive histologic studies, all made the same negative observations, although
Glaesmer found "decidua-like" cells the origin of which she left in doubt. Her
specimen, however, was considerably older than ours and in discussing these cells
she stated that she had never found "decidua-like cells" in earlier cases.

Rashke,[13] on the other hand, claimed that he found an extensive decidual layer
into which chorionic villi were embedded.

Werth[3] quoting these diverse opinions says: "The question as to the forma-
tion of decidua in the interstitial ovum bed demands further careful study after
such controversial findings." Werth also declares that Rashke's report of his
histologic findings "are not clear and convincing and the very incomplete gross
description permits a doubt as to whether the specimen is an interstitial or a cornual
pregnancy."

Braxton-Hicks,[18] as early as 1860, emphasized the lack of decidua in the ovum capsule and Von Pappel[19] laid special emphasis on the absence of decidua.

The existence of decidua in the wall of the ovum capsule has been asserted by Webster, Gebhard, Martin, Orthmann, Garkesch and von Franque, while Kühne, Griffith, Aschoff, Heinsius and Füth have denied its presence.

Much of this difference of opinion is probably due to the failure to distinguish between "true decidua" and "decidual reaction." Some of the controversy, however, is due to differing interpretation of certain cells which Erna Glaesmer called "decidua-like" cells, some asserting that their origin is from the connective tissue hence decidual, some that they originate from muscle, and still others that they are chorial elements.

In our previous paper on tubal pregnancy[12] we came to the conclusion that these isolated cells were trophoblastic in origin, basing our opinion upon the apparent morphologic identity between them and the cells of the trophoblastic masses.

We have given more time to the study of the morphology and possible origin of these cells in this case than to any other phase of the subject.

In Fig. 11 we show undoubted trophoblastic cells infiltrating the wall of a vessel on the side toward the ovum and no such cells on the opposite side and in numerous places we have found morphologically identical cells which we believe are frequently interpreted as decidual cells, in fact, in our earlier investigations we thought they were decidual.

We confess that the courage of our convictions was rather weak until we were able to convince some trained microscopists of their trophoblastic origin. Aschoff and others have also taken this view.

We found nothing more than decidual islands anywhere else outside the uterine cavity but we found distinct "decidual reaction" outside the ovum capsule in the pregnant tube, quite marked on the side towards the uterine cavity, but found none in the tube distally. We found it also to a lesser degree in the opposite, non-pregnant tube.

The Ovum Bed.—The ovum bed is in the uterine musculature at the base of the tumor (Figs. 3 and 4). We were enabled, by virtue of having the uterine body as well as the interstitial pregnancy in our serial sections, to trace the tube throughout its entire length and thus discover the point of implantation and the location of the place where the ovum eroded itself through the wall of the tube into the musculature (Fig. 6). In this location more villi are found than at any other place in the ovum capsule, some of which are seen to be in the wall of the torn remnant of the tube (Figs. 3 and 7). At this point also the vessels from which the hemorrhage came are seen with the eroding villi in their walls and the blood coming from the openings made by them (Fig. 8).

There are large masses of trophoblastic cells in the ovum bed in addition to those still a part of the villi. These masses grow smaller and smaller the farther away we get from the ovum bed finally becoming scattered as isolated cells throughout the ovum capsule.

The Ovum Vesicle.—The vesicle is distorted, irregular and torn, (Fig. 3) possibly due to the pressure of the enormous hemorrhage. The most careful and prolonged search revealed no evidence of an embryo. Scattered throughout the blood in the ovum capsule numerous broken villi may be seen (Fig. 3) some of them are a part of the vesicle or in its immediate neighborhood; some entirely disconnected and still others in contact with the ovum capsule or partially buried in its wall and some in the act of eroding vessels. The wall of the ovum capsule is lined almost over its whole inner surface with the trophoblastic cells.

Hemorrhage.—The content of the ovum capsule is chiefly clotted blood (Figs. 3 and 4). The hemorrhage here is so great that it accounts for the size of the

tumor and we believe also for the fact that the embryonic vesical is distorted and broken (Fig. 3).

It also largely accounts for the tearing asunder of the interstitial tube forcing the torn ends 3.4 centimeters apart (Figs. 3 and 7).

This bleeding came from the large vessels at the cornu of the uterus (Fig. 3). This point we have proved by tracing the vessels through many slides to their origin at the horn and by searching for and discovering the point where the vessel walls were opened up by the villi (Fig. 8). When one notes the size of these vessels and the blood pouring from the eroded openings the amount of bleeding is no longer a source of wonder.

We also found bleeding in the pregnant proximal portion of the pregnant interstitial tube (Fig. 6) which we thought at first came from the ovum bed but we could not trace it to that origin and when we found blood also in the opposite nonpregnant intramural tube we concluded that the bleeding originated in the tube itself, probably due to a regressive process. No blood was found in the portion of the tube distal to the ovum. There was considerable hemorrhage in the uterine cavity which was more on the side toward the pregnancy. On cursory examination, this seemed to be coming from the pregnant tube, but more careful investigation showed that its origin was in the decidua compacta which it infiltrated; it also encroached upon the spongy decidua in some places, compressing and flattening the glands (Fig. 4).

While venous spaces (Fig. 11) may be seen throughout the stroma they are more evident in the compact layer where the hemorrhage took place. Fig. 11 shows that the hemorrhage has occurred within the decidual tissue and is not flowing over it from the ovum above. We came to the conclusion, on account of having traced the bleeding in the ovum capsule and the decidua to their sources in the immediate neighborhood, that all other hemorrhages found had a similar local origin.

SUMMARY

Interstitial pregnancy differs from other types of ectopic gestation only as the peculiar anatomic conditions which surround it may modify its progress.

For example: the course and structure of the intramural tube leads to implantation near the posterior wall of the fundus resulting in the characteristic tumor; the structure of the tube and uterine wall favor early rupture of the tube and late rupture of the ovum capsule, and the large size of the vessels at the cornu of the uterus which may be eroded explains the unusual hemorrhage.

The behavior of the decidua is identical with other forms of ectopic pregnancy. On account of having the whole body of the uterus we have been enabled to study some features of the condition not hitherto possible, such as the tracing of the pregnant tube throughout its entire length from the uterine cavity to the ovum capsule and thence, in the wall of the ovum capsule, to the free portion of the fallopian tube. The opposite tube was also at our disposal for comparison, as a normal structure, with the abnormal pregnant tube and the serial sections permitted us to make comparative measurements of both tubes. These sections also enabled us to make accurate meas-

urements, for the first time, of the thickness of the uterine walls on both the pregnant and nonpregnant side.

We were fortunate also in possessing a specimen in which we could locate the place of implantation and rupture of the tube as well as the exact source of the hemorrhage and finally the sections of the whole organ which preserve all the anatomic relations permitted comparative anatomic and histologic studies.

CONCLUSIONS

1. Interstitial pregnancies are always found within the musculature of the uterus because of the early rupture of the tube.

2. The age of our ovum is probably less than three weeks, inasmuch as the uterus was removed twelve days after the date of the expected but skipped menstruation.

3. Rupture of the tube and escape into the uterine musculature occurred before this.

4. At the site of implantation and rupture the lumen of the tube measured 4 mm. in diameter or two and a half times the normal measurement, hence the tube must have ruptured when it had attained this size.

5. The site of implantation and rupture is proved by finding the tube dilated and villi within the dilated portion and in the wall at the point of rupture.

6. No uterine glands were seen in the tube beyond the uterine ostium.

7. The transition from uterine to tubal epithelium is rapid but not abrupt.

8. The tubal musculature is distinct from the uterine muscle but the outer layer is not always easy to differentiate.

9. The uterine muscle hypertrophies very early and the wall is thicker on the pregnant side.

10. True decidua is found only in the uterine cavity.

11. "Decidual reaction," is present in both tubes but is entirely absent in the ovum capsule.

12. The so-called "decidua-like" cells are probably trophoblastic in origin.

13. Hemorrhage in the uterine cavity originates within the decidua, and bleeding elsewhere probably also originates locally.

14. Interstitial pregnancy repeats most of the features of ectopic gestation elsewhere, modified, however, by the peculiar anatomic conditions of its location.

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119 INSTITUTE OF ANATOMY.

THE USE OF NOVOCAINE IN OBSTETRICS*

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THE possibilities for the use of novocaine in obstetrics are many. At the last meeting of the American Gynecologic Society, F. C. Irving[1] reported thirty-one cesarean sections performed under morphine, scopolamine and local anesthesia with novocaine upon patients suffering from cardiac, renal or pulmonary disease. I have had one such case, a secundipara, twenty-three years old, with mitral stenosis, bilateral bronchopneumonia, and marked nitrogen retention, the blood urea nitrogen reaching 58.3 mg. per 100 c.c., who was operated upon with the technic described by Irving with gratifying results. The patient remembered nothing of being carried to the operating room or of the operation. Her postoperative course was uneventful except for a few days of abdominal distention and the consequent cardiac embarrassment. She, however, died of her heart condition complicated with recurring pleuritic effusion, 31 days later. The baby weighed $4^{10}/_{16}$ pounds at birth. He is now seven and one-half months old, and is thriving.

I have also found novocaine helpful in one case of vaginal cesarean section. This patient was a nullipara who came under my care at the end of her sixth month of gestation, with a systolic pressure of 210 mm., marked albuminuria with granular casts, and a dimness of vision so great that she could not recognize persons. Under the topical use of a 5 per cent solution of cocaine, I was able to introduce my finger into the uterus. A No. 5 Voorhees bag was placed, the bag was weighted, and the patient was given morphine and scopolamine and a proctoclysis of glucose solution. After 36 hours there was no further dilatation. Dr. Emory Hill gave a very unfavorable opinion of her eyegrounds. It seemed imperative that her uterus be emptied. Thirty-five c.c. of a 2 per cent novocaine solution (without adrenalin) were injected into the sacral canal. This gave sufficient anesthesia for the dissection of the bladder and a four inch incision in the anterior wall of the cervix.

When, however, I introduced my hand into the uterus, the patient became restless, and it was deemed best to give her nitrous oxide-oxygen with a little ether for the extraction. The suturing was completed under the sacral anesthesia. The baby was stillborn. The mother made an excellent recovery except that she has only three-twentieths vision.

It is, however, of the use of novocaine sacrally, or epidurally, in parturition that I ask your consideration. Stoeckel[2] in 1909, inspired by the work of the French urologist, Cathélin, with cocaine, used novocaine sacrally in 141 normal cases. Eighty-nine of them were primiparae. It was effective in varying degrees in 111 cases. The passage of the head through the vulva was entirely painless in nine and only slightly painful in sixteen of the patients. In 23 cases the pains were weaker and less frequent. This was especially noticeable when the injections were given early, and in one case the contractions ceased entirely and did not reappear for four days. This suggested to him that possibly abortions and premature labors could be stopped by this method. He noticed a slight atony and a little more bleeding until adrenalin was added to his solutions. The formula that gave him the best results was:

Novocaine	0.15
Suprarenin	0.000325
Aqua destill.	3.0
Normal salt sol.	30.0

The following year, Schlimpert and Schneider[3] reported their experiences with 155 gynecological and obstetrical cases in the Freiburg clinic. Only eleven were obstetrical. As an unassisted means of relieving the pains of childbirth these authors thought sacral anesthesia was worse than useless except in those patients who came into the clinic in the perineal stage. They recommend its use as an adjunct to "Dämmerschlaff" to afford the patient relief until the morphine and scopolamine have time to act. Nevertheless the next year Schlimpert[4] reported upon 149 obstetrical cases with this method. Rieländer[5] reported his experiences with sacral anesthesia in 65 cases, forty-six of them being primiparae. In twenty-three instances the use of novocaine epidurally was preceded by the nasal use of cocaine after the Koblanck method. In one-half of his patients the pain of labor was lessened. He, however, was unable to repair the perineum without causing pain. Baum[6] also used the "Stoeckel-Koblanck" method, reporting 50 cases (33 primiparae). Tobiaszek[7] reported 30 cases (17 primiparae) with little effect. There were three forceps deliveries and the operation was in every case painful. There was poor contraction of the uterus after the third stage in 40 per cent. He used a one-half per cent solution. Läwen[8] about this time called attention to the fact that one must use from a 1½ per cent to a 2 per cent solution of novocaine in order to get surgical anes-

thesia with sacral injection. The maximum dose that he recommends
is 0.4 gm. Zweifel[9] reports three cases of skin necrosis at the site of
injection. He attributes this to using 10 per cent iodine for the skin
disinfections. Kehrer[10] used much larger quantities than had hitherto
been employed, as much as 60 c.c. of a 1.5 per cent solution of novocaine
with a little adrenalin and sodium bicarbonate. He regarded the method
as an excellent one for gynecological operations, but rejected it for ob-
stetrical operations. Piantoni[11] in 1913, was struck with the rarity
of lacerations following its use.   In 1921, Schellekens[12] reported
favorable results in eight cases. He used 20 c.c. of a 2 per cent solu-
tion. Oldham[13] is enthusiastic about his experience, covering a period
of two years. He reports 6 cases, in two of which forceps were used,
with excellent results, but does not give any data about his results in
his other cases. Recently Meeker and Bonar[14] have published their
results with 90 obstetrical cases. Their work is beautifully illustrated,
and they go into the technic of the injections and the anatomy of the
sacral canal and the sacral nerves in the most thorough manner.   Their
cases were unselected, 54 being primiparae and 36 multiparae.   Twenty-
one were delivered with forceps, 3 by version, and 6 were breech extrac-
tions.   Relaxation of the perineum was the outstanding feature, so much
so that episiotomy was not necessary. In the spontaneous deliveries
the authors experienced the greatest difficulty in determining the proper
time for the injection. They state, as did also Schellekens, that there
was a tendency to apply the remedy too early in primiparae and too
late in multiparae.

TECHNIC

In most of my cases I used a 2 per cent solution of novocaine with
0.3 c.c. of 1:1000 adrenalin solution to each 40 c.c. of the novocaine
solution.   I have also tried a one per cent solution, but the duration
of the anesthesia was shorter and the anesthesia apparently less com-
plete.   In my last cases I have been using a 1½ per cent solution which
seems to give equally as good results as the stronger solution.   The pa-
tient is put in the left lateral position with the back arched and the
knees drawn up as recommended by Cathélin.[15] The skin is prepared
with iodine and alcohol. A little of the solution is injected subcuta-
neously with a fine needle, as a preparation for the larger needle.
In my earlier cases I used only 20 c.c. for an injection and in one very
satisfactory case I used only 10 c.c. After Meeker and Bonar's first
article appeared, I increased the amount to 30 and 35 c.c. of fluid.   The
patient is then turned upon her back. The anesthesia begins in from
10 to 15 minutes. Labat[16] recommends a nickel needle that is unbreak-
able. The importance of this was impressed upon me a short while
ago. I was helping the students in the out-patient service to do a
Hirst[17] intermediate repair of the perineum. The patient was a mus-

cular negress who had given birth to her first child six days previously. I introduced an ordinary lumbar puncture needle into the sacral hiatus in the usual manner, removed the stylet, and turned to fill the syringe with novocaine solution. The patient straightened out her thighs and partly raised her shoulders so as to turn her head and see what I was doing. The students heard the needle snap and the direction of the needle was greatly altered. The needle was withdrawn and when measured with the stylet it was seen that three-quarters of an inch was missing. The patient was taken to the hospital and the missing part of the needle was removed from the sacral canal under local anesthesia.

NERVE SUPPLY

A discussion of block anesthesia necessarily demands a discussion of nerve supply. That of the uterus is well understood anatomically. The description and cuts found, for instance, in the 1897 edition of Quain's[18] Anatomy still hold good. The nerve fibers of the uterus are derived principally from the hypogastric plexus, but some filaments are also added by the third and fourth sacral nerves. They are directed upward with the blood vessels between the layers of the broad ligament to the sides of the neck of the uterus (*ganglion cervicale* of Frankenhäuser). The fundus of the uterus also receives an offset from the ovarian plexus. The function of these nerves, however, is still a matter of dispute. According to Head[19] the sensory fibers of the fundus arise from the 10th, 11th, and 12th dorsal and the 1st lumbar and those of the os from the 2nd, 3rd, and 4th sacral segments. On the other hand Langley and Anderson[20], by stimulation experiments and by tracing the degenerated fibers after severing the nerve roots, proved that in the rabbit and cat, the sacral nerves send neither afferent nor efferent fibers to the internal generative organs. This does not accord with the views of clinicians.[21]

The vasoconstrictors run from the lumbar segments by way of the white rami to the sympathetic and to the inferior mesenteric ganglia, thence by way of the hypogastric nerves to the uterus (Langley and Anderson). Gaskell[22] says that both vasoconstrictors and vasodilators are contained in the sympathetic, while von Basch attributes the latter to the sacral nerves.

When it comes to considering the motor fibers to the uterus, one must not only divide the organ into two parts, the fundus and the cervix, but must also think of it in its embryonal condition as a tube with a longitudinal and a circular coat of muscle fibers. Fellner,[23] for instance, states that the ''nervi erigentes'' are motor for the longitudinal muscles of the fundus and for the circular muscles of the cervix and are inhibitory for the circular muscles of the fundus and the longitudinal muscles of the cervix. The hypogastric nerves on the other hand are motor for the circular muscles of the corpus uteri and for the longitu-

dinal muscles of the cervix and are inhibitory for the longitudinal muscles of the fundus and for the circular muscles of the cervix. Keiffer[24] shares this view, maintaining that the os is a true sphincter and dilates at the approach of the peristaltic wave. On the other hand von Basch and Hofman[25] state that stimulation of the hyopgastrics causes a contraction of the circular muscles of the entire uterus, while stimulation of the cerebrospinal nerves causes the longitudinal fibers to contract. Langley and Anderson find that stimulation of the lumbar nerves causes a contraction of all the fibers of the uterus and vagina in both rabbits and cats. Cushny[26] found that hypogastric stimulation produced, in the rabbit, powerful contraction of the whole uterus irrespective of its pregnant or nonpregnant condition. However in one pregnant rabbit stimulation of this nerve induced pure inhibition. In the virgin cat hypogastric stimulation was inhibitory, the uterus undergoing relaxation. On the other hand in the cat during pregnancy, or as a general rule, after pregnancy, hypogastric stimulation led to strong and immediate contraction just as in the rabbit. It is supposed, therefore, that inhibitory fibers prevail in the virgin, but during and after pregnancy the action of the motor fibers conceal their presence. Whitehouse and Featherstone[27] who noted the behavior of the uterus at cesarean section when operating under spinal anesthesia and also the behavior of the uterus of rabbits under the same treatment, conclude that when the lumbar cord is narcotized the uterus always contracts and does not relax until the drug ceases to act. The contraction seems to involve the circular muscle fibers only, the longitudinal ones being unaffected. The lower uterine segment and the cervix also appear to be involved in the increased uterine "tone." The action is the same regardless of the stage of gestation.

The nervous mechanism of parturition is still a matter of considerable speculation. Centers are said to exist in the cortex, the medulla, the cerebellum, the lumbar enlargement, and in the uterus itself.[28] Kehrer,[29] Kurdinosky,[30] Helme,[31] Keye,[32] and others have shown that the uterus of animals, when removed from the body and kept under proper conditions of moisture and heat, has regular rhythmic contractions. Franz[33] has shown that the same is true for strips of human uterus. Sir James Y. Simpson[34] removed the dorsal and lumbar cord from a number of sows a few days before parturition was due. The animals that survived, littered normally until the last fetus, which was not delivered. On the other hand, Goltz and Ewald[35] completely excised the cord of a bitch from the middorsal region downwards, and report that after the operation the animal went into normal "heat," became pregnant and in due time produced a litter of pups. In human beings with paraplegia[36] at the level of the middorsal region, labor sets in and proceeds normally but painlessly. In some of the cases reported it was noted that there

was a lack of proper pause between the contractions. In Brachet's case, however, where the spinal lesion apparently involved the lumbar cord, the uterus failed to make normal contractions and the child was eventually extracted with forceps. DeLee mentions a similar case of his own. The subject is full of contradictions and as Vignes[37] well says, needs further investigation.

To summarize, I can do no better than to give Marshall's[38] conclusions upon this very perplexing subject. ''(1) The act of parturition is partly automatic and partly reflex, these actions corresponding in the main to the first and second stages of labor, respectively, the spinal reflexes usually commencing as soon as the membranes have ruptured. (2) Direct communication with the brain is not essential for the proper coordination of uterine action, but the brain appears to exercise a controlling influence of some kind. Thus emotions often become a hindrance to the progress of parturition. It would seem possible that this inhibition of uterine contractions is brought about by an inhibition of a center in the brain. (3) Direct communication between the uterus and the lumbar region of the cord is generally essential for the occurrence of those rhythmical contractions which take place during the progress of normal labor. There is experimental evidence upon animals, however, that the uterus is sometimes able automatically to expel its contents, at least as far as the relaxed portion of the genital tract, even when entirely deprived of all spinal influence.''

SAFETY

The experiences in general surgery would indicate that epidural anesthesia is relatively safe. Zweifel[39] was able to collect 10 fatalities in 4,200 cases on record. In only three could the anesthetic be held responsible and in these 0.6 gm. was the smallest dose used. No mishaps have been recorded with doses of 0.4 or 0.5 gm. The obstetrician has also to consider the influence of the anesthetic upon the child and upon the uterus, especially in connection with the question of postpartum hemorrhage. The testimony of those who have used this method in obstetrics is, that it has no influence upon the child, and indeed it is difficult to see how it could have a deleterious effect.

The question of increased postpartum bleeding is not so easily dismissed. One would rather expect with the marked atony of the lower uterine segment that follows sacral anesthesia, to get hemorrhage in cases of low implantation of the placenta. This has not proved to be so in the few cases of placenta previa that I have had. Stoeckel[2] noticed a little more postpartum bleeding than usual until he added adrenalin to his solutions and Tobiaszek[7] stated that 46 per cent of his cases had poor contraction of the uterus after the third stage. In a small number of my cases there was a troublesome trickling of blood in spite of a firmly contracted fundus and even of vaginal packing. I was puzzled

to account for this until I explored the cervix and found the bleeding to be coming from small tears that ordinarily would have caused no symptoms. A repair of these stopped the bleeding completely. This possibility, I believe, must be borne in mind in using this form of anesthesia in obstetrics.

CLINICAL RESULTS

My experience with sacral anesthesia consists of 103 cases including the vaginal cesarean section detailed above. Three were cases of incomplete abortion in which the uterus was cleaned out with the finger or with placental forceps under the guidance of the finger. Three were inevitable abortions. One was a case in which the uterus was emptied at the second month on account of postdiphtheritic paralysis involving the pharynx, the larynx and the heart, extreme prostration, and pernicious vomiting. One was a nullipara in the sixth month with a placenta previa. Sacral anesthesia was used to introduce the bag, but she delivered herself spontaneously without anesthesia. In the remaining 94 cases, sacral anesthesia was used in delivery.

Many of the patients complained of feeling a little queer immediately after the injection. Two had noisy attacks of hysteria. One had tetany that lasted for a few minutes. A few vomited shortly after the treatment, and a great many looked a little pale about the lips for five or ten minutes. One case, a primapara who was seen in consultation after she had been in labor twenty-four hours, had marked and rapid variations in blood pressure. When I first saw her, the systolic pressure was 158 mm. She was given 35 c.c. of a 1½ per cent novocaine solution with 5 minims of adrenalin. Before I had hardly finished the injection, the patient complained of feeling queer. The systolic pressure was found to be 220 mm. It fell some ten points every two minutes and within eight minutes it was 160 mm. The patient then felt well and had an excellent anesthesia. An easy version and extraction was done. The patient lost more blood than usual in the third stage, perhaps 400 c.c. Just after the expulsion of the placenta her color became ashen and perspiration stood out on her forehead and lips. The blood pressure was 75/40 and fell in a few minutes more to 60/20. There was no external bleeding. The uterus was contracted. The patient was somnolent, but when aroused she said she felt perfectly well, and persisted in talking about what a painless delivery she had had. After 200 c.c. of saline with ten minims of adrenalin were given subcutaneously, the blood pressure gradually rose. Her physician tells me that for some time he had been watching her on account of extreme nervousness and rapid pulse. There was no visible enlargement of the thyroid.

Usually, there is little change in the blood pressure, possibly a slight rise at first and a corresponding fall in the course of 10 or 15 minutes.

The chart shows the behavior of the blood pressure and pulse in an average case.

Seventy of the 103 cases had excellent anesthesia. In this group were all the cases of abortions, one case in which a Voorhees bag was placed, 50 versions and extractions, eight forceps, three breech extractions and one spontaneous delivery. Ambrosini[40] got good anesthesia in 78 per cent of his gynecologic cases. In 22 cases there was partial anesthesia. This group includes all those patients who had evidences of local anesthesia, but who for various reasons had also a general anesthesia. Most of the cases in which I used a one per cent solution of novocaine fall into this group. In several instances the anesthesia was complete but wore off before delivery. In other instances the anesthesia was good, but the patients wanted to be put to sleep, either because they were asleep at previous deliveries, or else were nervous and apprehensive. This group also includes those cases that would not cooperate either
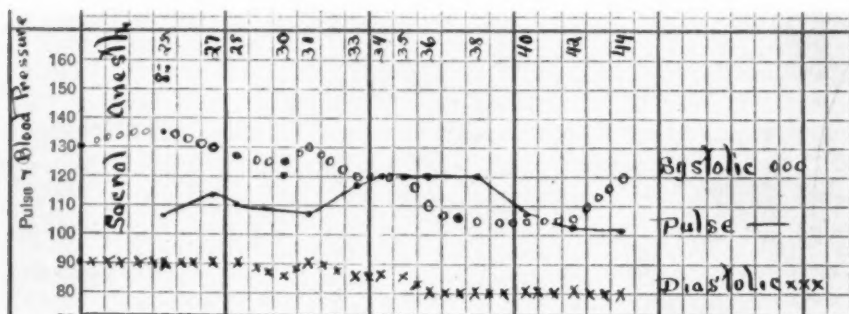
Fig. 1.—Chart showing the usual behavior of the pulse and the systolic and diastolic blood pressure after sacral anesthesia. Each square horizontally represents a minute.

because they had a fixed idea about needing chloroform or were under the influence of hyoscine. There were ten failures. Five of these occurred in the first fifteen cases and were due no doubt to faulty technic. Among the latter five were two cases whose sacral canal was so shallow anteroposteriorly that I was unable to get my needle into it.

The most constant feature of the sacral anesthesia is the marked relaxation of the perineum and the cervix and the absence of pain. (Figs. 3-6.) The tone of the body of the uterus varied somewhat. In only two instances was it so great as to prevent my doing a version. The lack of any anesthesia of the abdominal muscle complicated somewhat the management of the head in these cases. Forceps were applied to the aftercoming head eight times. Meeker and Bonar[14] remark on the ease with which accouchement forcé can be done. I have dilated the cervix manually twice under sacral anesthesia. One patient was a multipara with a systolic pressure of 220, headache and vomiting. She was at term and was quarantined
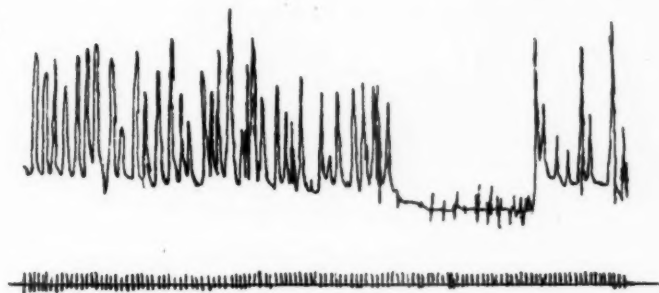
Fig. 2.—India ink tracing of a hysterogram (⅕ actual size) showing the psychic effect of sacral puncture without injection of any drug. This patient had so shallow a sacral canal that I was unable to introduce a needle. Note contractions stopped for 28 minutes. The timer marks minutes in this as well as the subsequent figures.
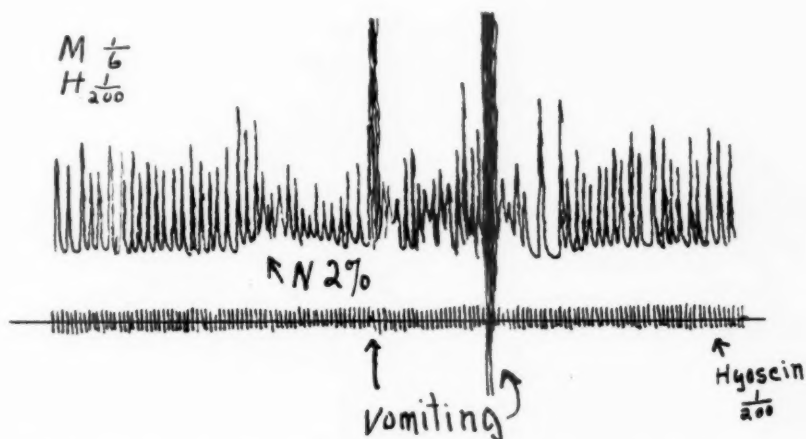
Fig. 3.—Tracing of a hysterogram (⅕ size) showing the usual effect of sacral injection of novocaine (2 per cent) upon the strength and frequency of uterine contractions. This patient received ⅛ grain morphine and ¹⁄₂₀₀ grain of hyoscine 2½ hours before the novocaine was injected. In this case the contractions resumed their former strength in 55 minutes. The patient felt no pain for 1½ hours at which time she was given ¹⁄₂₀₀ grain of hyoscine.
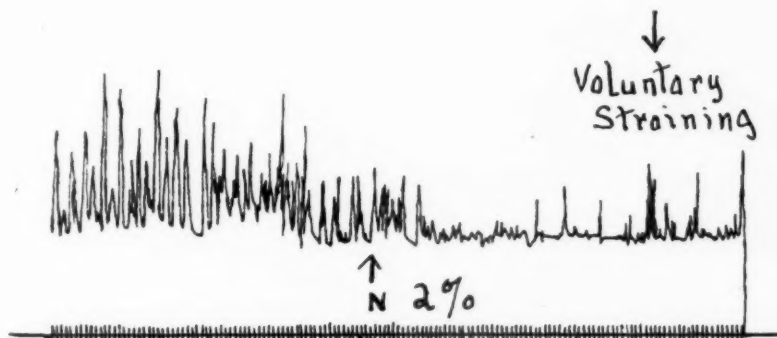
Fig. 4.—Tracing of a hysterogram (⅕ size) showing the entire cessation of uterine contractions for 1¼ hours after injection of 2 per cent novocaine.

at home on account of scarlet fever in the family. A large dose of castor oil failed to start labor pains. It was comparatively easy to dilate the cervix manually and to deliver her by version and extraction. The other accouchement forcé was in a primipara and was somewhat more difficult, but was entirely painless. The fewness of perineal lacerations has been remarked upon by Piantoni[11] and others. One of my patients
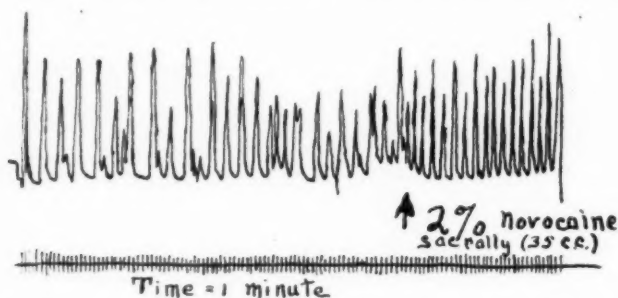
Fig. 5.—Tracing of hysterogram (⅚ size) showing an increase in frequency and no diminution in strength of uterine contractions after the injection of 2 per cent novocaine. This patient had excellent anesthesia and marked relaxation.
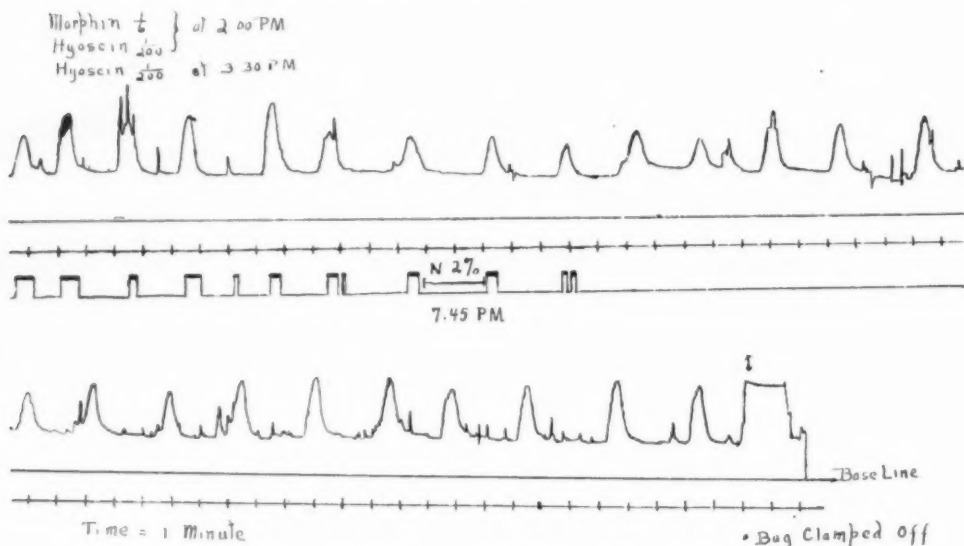
Fig. 6.—Tracing of hysterogram (⁵⁄₁₁ size) showing the relation of subjective pain to uterine contractions. This patient was given a signal button to press whenever she felt a pain. Note that she felt only two pains after the injection was completed. In this tracing the base line is indicated by a special marker instead of by the timer as in the previous hysterograms.

had a second degree tear. The remainder escaped with either no lacerations or else with a small split in the mucosa. Even the patients with funnel pelvis escape perineal injury. I recall one case particularly, a primipara, thirty-eight years old, who was brought into the hospital from the country after being in labor two days. The head was in a transverse position. The patient was given 35 c.c. of a 2 per cent novo-

caine solution into the sacral canal, and Kielland's forceps were applied
(but not in accordance with the Kielland technic).   I delivered the head
with great deliberateness and comparative ease, taking 55 minutes for
the operation.   There was no tear of the perineum and only the slightest
sort of red mark on the baby's cheeks.

<div style="text-align:center">COMPLICATIONS</div>

Two of the patients had placenta previa of the marginal variety.
Three were toxic, one had an organic heart disease, one acute bronchitis,
and one a prolapsed cord.   There was one set of twins.   One patient had
a postpartum hemorrhage that was easily controlled by packing, and
one had postpartum eclampsia with recovery.   The baby died on the
third day and autopsy showed a marked degeneration of the liver.   The
twins were premature and died on the sixth day of pneumonia.   One
other baby died about the same time of pneumonia.   The baby with a
prolapsed cord had scarcely any pulsation when first seen.   The delivery
was in another town and was complicated by the electric lights going
out just as I was in the midst of a version.   There was one other death,
that of cerebral hemorrhage in an infant delivered by version.

<div style="text-align:center">DISCUSSION</div>

It is interesting to speculate what effect novocaine, given into the
sacral canal, has upon parturition.   There are certain very definite
results.   Most noteworthy is the marked relaxation of the lower portion
of the birth canal.   The vagina and the external os are very atonic.   In
contrast to this is the tonicity of the fundus.   The height of the line of
demarcation between the tonic and the atonic portions of the uterus
varies somewhat in different patients.   It is especially evident after
delivery.   In one of my early cases, in which I had occasion to make a
vaginal examination, the cervix was so relaxed and the fundus so small
and hard in contrast, that it seemed as if it would certainly fall through
the cervix.   This sensation was so startling that I packed the vagina to
prevent what seemed to be an inevitable inversion of the uterus.   On
the other hand in only two cases was the fundus so contracted before
delivery that I was deterred from doing a version.

There is also a complete relief from pain.   This is true whether the
uterus contracts or not.   The effect upon uterine contractions, however,
is variable.   In the majority of patients, there is a cessation of contrac-
tions or at least a diminution of their force for 20 or 60 minutes after
the injection.   The pains then return to their former frequency and
force.   In a few cases the cessation of uterine contractions lasts for 50
minutes or more.   In one of my cases in which a Voorhees bag within the
cervix was connected with a manometer and a record of the contractions
obtained, there was no lessening in the force of contractions, and an
actual increase in their frequency.

If our ideas as to the nervous mechanism of parturition are correct, i. e., the first stage is largely automatic and the second stage partly reflex, then we would expect sacral anesthesia to interfere seriously with the spontaneous expulsion of the fetus. Such has certainly been my experience. Probably there would have been more than one spontaneous delivery in the 62 deliveries in which I obtained perfect sacral anesthesia, had I waited longer. Meeker and Bonar[14] speak of instructing the patient how to use her abdominal muscles. I have had very little success in such instruction. Recently I delivered a patient in her home that illustrates this. The patient had had two easy spontaneous deliveries previously. When I first saw her she was having good second stage pains with beads of perspiration standing out on her forehead. I injected 35 c.c. of one and one-half per cent novocaine solution into the sacral canal and within 10 minutes she straightened out in bed and all her pains had ceased. The uterus could be felt to harden rhythmically. The head was on the perineum and needed but a few straining efforts for its delivery. I explained all this to the patient and she said that she seemed just not to know how to strain. After waiting an hour I lifted the head over the perineum with forceps.

CONCLUSIONS

1. Novocaine sacrally produces marked relaxation of the perineum and the external os, with anesthesia to pain and also largely to pressure.

2. It produces moderate increase in tone of the fundus.

3. The effect upon uterine contraction is variable.

4. It is an excellent procedure for operative obstetrics, but its value for spontaneous delivery is dubious.

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URETERAL STRICTURE IN OBSTETRICS; WITH SPECIAL REFERENCE TO MULTIPLE ABORTIONS (RENAL) AND TO PYELITIS OF PREGNANCY*

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BEFORE presenting pyeloureterograms of patients with the pyelitis of pregnancy and the puerperium, I wish to give a brief résumé of facts and theories on ureteral stricture derived from a study of over 2,000 cases. In speaking to an audience of urologists I no longer consider this to be necessary, for they are supposed to be familiar with my viewpoint, no matter how widely they may differ; but for an audience composed of workers in other branches of medicine the general subject of ureteral stricture is still an unfamiliar one.

Most ureteral strictures are due to an intrinsic inflammatory condition of the ureteral walls resulting in a narrowing of the ureteral lumen. It is probable that developmental errors of fetal life account for some strictures.

From a perusal of present day literature it would appear that most urologists look upon a stricture as a lesion with fixed and permanent characteristics; hence the frequent use of such terms as "wide caliber" and "narrow caliber" stricture. As a matter of fact, for days, weeks or months a stricture may have a caliber sufficiently wide to permit such good drainage that the patient is not aware of any defect; and yet within an hour he may be the victim of a severe renal colic which may persist for hours or days of the most intense suffering. What has happened?

The "wide caliber" stricture has developed a fresh inflammatory reaction and it suddenly becomes a "narrow caliber" stricture. The premenstrual or menstrual congestion, the added congestion of a pregnancy, or possibly pressure or displacements due to pregnancy, or inflammation of neighboring organs, such as the appendix or fallopian tubes, have added the factors that cause a further narrowing or a complete closure of an already narrowed area in the ureteral wall. Other common factors bringing about a congestion or a fresh

inflammation in a quiescent stricture area are: getting the feet wet, becoming chilled, and various traumatic factors such as a long rough ride, heavy lifting, sudden twisting or wrenching of the body in falls or accidents, abdominal operations, and trauma of childbirth. Many patients date the onset of their illness from a definite hour and attribute the attack to one or other of the above causes. In all probability such traumatic factors are seldom the actual cause of a stricture, but it is certain that they not infrequently stir up so much congestion in a previously quiescent stricture area, that from this time on the symptoms may persist. On the other hand, the symptoms may disappear in a short time, only to reappear with some future exposure or trauma. Such observations are important in the medicolegal field.

Experience in the care of stricture cases has not only led to the above conclusions which seem to alter some of our previous conceptions of the so-called wide caliber and narrow caliber strictures, but it has also utterly exploded some of the ideas still being tenaciously cherished by many urologists. Two of their favorite dicta are: (1) that infiltration of the ureteral wall sufficient to cause a narrowing of the lumen must result in gross dilatation above; and (2) that gross changes in the upper tract due to stricture must cause symptoms. The answer to these pronouncements is: logically they seem to be correct; experimentally many exceptions are found.

Etiology.—We have had sufficient experience with ureteral strictures to state with some degree of certainty that they usually arise from some distant focal infection and that by far the most common foci are in the tonsils, teeth, and sinuses. Some of the less common foci are probably in the gastrointestinal tract, including the gall bladder and appendix, in the cervix, or in any portion of the body where there exists a chronic suppurative process.

The reasons for believing that distant focal infections can cause ureteral stricture are briefly: (1) the almost universal location of the strictures near groups of lymph glands, namely, in the broad ligament region, and near the bifurcation of the anterior iliac vessels; (2) the frequency with which one gets a history of the primary onset of ureteral symptoms after an attack of grippe, tonsillitis, or sinusitis; (3) the frequency with which patients who have been relieved of their ureteral stricture symptoms come back after the lapse of months or years with the history that they had been well until recently, but that the symptoms had returned after an attack of grippe, tonsillitis, sinusitis, or after having some dental work done; (4) an occasional patient, after operation for one of these distant focal infections will complain more of a recrudescence of the ureteral pain than of the pain in the operation area. Cystoscopy in such cases, a week or ten days after the operation, sometimes reveals a marked redness, swell-

ing, and edema of the mucosa about one or both ureteral orifices; (5) many patients make very little or no progress under treatment for the ureteral condition until the original area of distant focal infection has been eliminated.

In order to test the theory of the causal relationship between focal infections and stricture, it has been my practice to be conservative about the possible infection foci until a test has been made of ureteral treatments alone, simply telling the patient that if we are not successful in giving permanent relief we may direct radical attention to the focal infection areas. It has been surprising to see what a large proportion of patients fail to remain free from ureteral symptoms until the infection foci have been eradicated. Of course, many stricture patients before reaching the urologist have already been treated for their focal infections, because of previous headaches, throat or bronchial inflammations, arthritic or other conditions.

Age.—I have treated stricture in patients ranging in age from three to seventy-eight years. Many of the patients seen in later childhood or early adult life have had definite stricture symptoms since early childhood.

Sex.—Many urologists are excusing their disregard of this most important of all urologic lesions with the plea that stricture may possibly occur fairly frequently in the female but is not found in the male. The first answer to this is that strictures were rarely found in the female until they were looked for. On a recent visit to New York I found Lowsley, of the Brady Institute, showing many striking pyeloureterograms of stricture in males, and Rathbun of the Brooklyn Hospital, whose urologic clinic is visited by about an equal number of men and women, assured me that, on recently reviewing his records over a period of several months, he found stricture diagnosed in more males than females.

Symptoms and Diagnosis.—Because this morbid condition has only recently been called to the attention of the profession, there is a natural tendency to skepticism concerning its existence and a feeling that it mainly concerns the specialist. If we pause to consider that it is one of the most frequent lesions in the abdominopelvic cavity, and that the symptoms due to ureteral stricture are daily causing more useless and fruitless operations on the abdominal and pelvic organs than are caused by diseases of any other viscus, we may well ask whether the subject is not one for the serious consideration of every physician.

Every general practitioner should be able from the anamnesis and physical examination to make at least a probable diagnosis of stricture. This is often as near as he can come to a diagnosis of chronic cholecystitis or chronic appendicitis, and no one would say that these

diseases are not within his province because he has to use special diagnostic methods or call in the surgeon to verify his diagnosis.

Ureteral stricture, because of its usual location in the pelvis in close proximity to various nerve plexuses, is likely to present not only its local inflammatory symptoms but various referred symptoms in the bladder, rectum, vagina, perineum, hip, and thigh. Because of its resultant urinary stasis we may have any variety of kidney discomfort, from a dull backache to the most excruciating renal colic; and not infrequently we see, as in other forms of kidney disturbance, marked gastrointestinal manifestations, such as indigestion, nausea, gaseous distention, and abdominal pain. Either the urinary stasis and absorption or the gastrointestinal condition, or a combination of both, may result in headache, at times of the severe migrainous type with the accompanying crises of nausea and vomiting; or the general picture may be that of uremia, associated with serious mental disturbances. In spite of the varied and complex symptoms that may arise from ureteral stricture the diagnosis, as a rule, is not difficult and should be made with a fair degree of certainty by the general practitioner. But, first of all, he should remember that the disease is not at all rare and that he should bear it in mind in his daily work, and consider its possible presence in any patient with vague or complicated abdominal or pelvic pains. It is the first possibility to be thought of in the case of any patient who has had from one to a dozen abdominal operations without relief of the original symptoms.

The chief aids in diagnosis are the presence of pain in the pelvic region, usually thought by women to be due to the ovaries or uterus, backache, and bladder symptoms. These symptoms are likely to be of intermittent occurrence, particularly in the early history of the disease, and in this early stage they are especially prone to occur as premenstrual or menstrual disturbances. Bladder symptoms occur in 70 per cent of the cases, and in 33 per cent form one of the chief complaints.

The urinalysis may be helpful, or, because of its normal or approximately normal character, it may be quite misleading. In 20 per cent of our ureteral stricture patients there is a pyelitis, an infected hydronephrosis, or a pyonephrosis, with a urinalysis calling one's attention at once to the urinary tract. In 50 per cent one finds only slight evidences of urinary tract disease, such as a trace of albumin, an occasional cast, an occasional leucocyte or erythrocyte. In the past these slight evidences of trouble have too often been ignored as being of no significance. In 30 per cent of patients with normal urine, the urinalysis has been the chief factor in preventing a correct diagnosis. The patients often give a history pointing strongly to some urinary tract lesion, but on the evidence of a normal urinalysis even the urologist too often refers these patients to some other branch of medicine for

diagnosis and treatment, while himself holding the only means for their relief.

Another distinct aid in the diagnosis by the general practitioner is the knowledge to be gained by palpation. In women the right kidney is usually, the left only occasionally, palpable. Ureteral stricture is usually bilateral, although the symptoms may be confined to one side only. Whether the kidney is palpable or not, one usually finds some degree of tenderness on bimanual palpation of the kidney region, or the patient will volunteer, "that is where I often have a soreness."

Usually both ureters are tender on palpation at their crossing of the pelvic brim, or at a point about one inch to one side of and one inch below the navel. This sign has led to countless futile appendicitis operations even when it was present over the left ureter alone. Finally, palpation of the diseased ureters near their entry to the bladder elicits much soreness or pain, reminding the patient of the previous pelvic discomforts, and causing a desire to void, especially if bladder symptoms have previously been present.

End-Results.—Recently a questionnaire was sent to my first 300 patients treated for ureteral stricture and the final request was that the patient classify herself under one of the following four conditions: (1) cured; (2) much improved; (3) improved; (4) not improved.

Taking the first one hundred answers, including patients to whom the treatments had been given from five to eight years previously, the classification resulted as follows:

Cured 29
Much improved 50
Improved 15
Not improved 6

Such results compare favorably with those obtained in most lines of medical or surgical treatment, and they are especially gratifying when one considers the character of patients dealt with. Many of them had been subjected to multiple operations and many belonged in the class usually considered as hopeless neurasthenics.

The failure to "cure" in some instances is probably due to morbidity left by operations; in some it may be due to the symptoms of a spinal or pelvic arthritis, a not uncommon complication in patients subject to focal infections. In some, the residual symptoms may be caused by a chronic cholecystitis, or appendicitis, or some slight pelvic lesion, the evidences of such chronic conditions not having been sufficient to warrant an exploratory operation.

The results are particularly satisfactory when one considers that in all probability they could not have been obtained from any other form of treatment.

Pathologic Changes in the Kidney Due to Ureteral Stricture.—Without having time to review the actual figures in the following groups of kidney lesions I should estimate that I have seen and treated approximately 400 cases of chronic and recurring pyelitis, associated with ureteral stricture in over 90 per cent; approximately the same number of hydronephrosis cases with an equally high percentage associated with stricture; approximately 200 cases of calculus with demonstrable stricture in over 90 per cent.

In a recent study (*Ureteral Stricture an Important Etiological Factor in the so-called Essential Hematurias,* Jour. Am. Med. Assn., 1922, lxxix, 1731) I reported on my last eighteen consecutive patients with essential hematuria in which there were found twenty-five bleeding kidneys, all associated with ureteral stricture. Since becoming interested in stricture I have seen approximately thirty patients with congenital malformation of the kidneys and ureters and the secondary conditions which prompted the patient to seek relief were associated, in all but one of them, with ureteral stricture.

Some patients who are being treated for a purely medical nephritis have in reality a nephritis associated with mechanical obstruction and can be made vastly more comfortable by being given good drainage through the dilatation of a ureteral stricture.

Ureteral Stricture and Pregnancy.—We now come to the main subject, namely, the part that ureteral stricture plays in those cases of multiple abortion and of premature delivery due to kidney defects, and in the more familiar cases of pyelitis during pregnancy and the puerperium. Of the first group I have a list of seventeen cases. The records in many of these were obtained some years after the abortions or premature births, the patient consulting me because of symptoms due to ureteral stricture. The criticism that I am assuming too much in presenting such records as those of cause and effect is accepted with humility, and I wish to state that I have not had enough experience with this group of cases to present anything of proved scientific value. The records in these cases are for the most part founded on such uncertain data as one obtains by getting the patient's history of abortions or premature births due to "kidney failure" and accompanied by such symptoms as oliguria, albuminuria, headaches and gastrointestinal symptoms, temporary blindness, edema, and "eclampsia, with convulsions." Syphilis as a factor has been excluded in most of these cases by the Wassermann test.

It is not necessary before such an audience to dwell on the nebulous state of our knowledge concerning the various toxemias of pregnancy. However, if future work demonstrates that some of those due to renal deficiency have as a background injury to the kidney caused by ureteral stricture we shall have made some progress in our diagnosis and therapeusis.

I wish to report briefly on three patients who seem to belong in this group and in whom the intervention by ureteral treatments certainly had a favorable influence on the general health, and apparently enabled them to carry subsequent pregnancies through to uneventful term.

Mrs. W., aged forty-five years, married at thirty-eight. For ten years she had suffered with indigestion. Three years before I saw her a full-term child had been born after a stormy pregnancy marked by uremic symptoms. The child was poorly nourished and died on the sixteenth day. Her physician said she had just escaped convulsions in labor and should never become pregnant again. Recently she had developed a feeling of ''falling of the womb'' and had a constant sore nagging spot low in the left pelvis, with severe dyspareunia. Her ''indigestion'' seemed to be exaggerated when the sore spot was worse. Bilateral stricture was found with a moderate hydronephrosis of 15 c.c. on the left side. After dilatation to a 6 mm. (18 Fr.) bulb her symptoms of indigestion, falling of the womb, and dyspareunia ceased, and her general health became better than for years. Seven months after beginning treatment she again became pregnant and was delivered at term of a large healthy boy.

Mrs. L., aged thirty-one years, was referred March 21, 1921, by Albert Singewald. Four years before she had had a premature delivery at seven months, the child living one year. At the fifth month of pregnancy it was found that she had a marked albuminuria. Whenever examined in the intervening four years, there was albuminuria. At my first consultation the patient was complaining of irregular bleeding of about four weeks' duration, pains in the ovarian regions, severe headache, and marked nervousness. She was found to be about two to three months pregnant and the urine contained one gram of albumin to the liter. She was found to have ureteral strictures which were so firm that the first wax bulbs of 3.6 mm. (11 Fr.), passed on either side, were molded back on the catheter because of the dense obstruction in going through the stricture areas.

When she returned for treatment two weeks later the albumin had lessened to half a gram per liter. After the second dilatation with a 4.3 mm. bulb (13 Fr.), the albumin again decreased by about one-half by the time of the third treatment two weeks later. A 5 mm. bulb (15 Fr.) was used on the third and fourth visits, after which the patient went on to term with no unusual symptoms, although a distinct trace of albumin persisted, and she had an occasional dull headache.

This patient was seen again in April, 1923. Her baby, born in August, 1921, was strong and well. Singewald had examined her urine from time to time, always finding some albumin. After an attack of grippe in December, 1922, the albumin had increased and in January, 1923, the systolic blood pressure was 225. It was 190 when I saw her in April. After two dilatations on either side the patient felt greatly improved and I have not seen her since, but Singewald reports that she is again extremely nervous and complains of headaches and backache. The patient has an old history of quinsy and her tonsils are manifestly diseased. It is quite likely that her strictures will continue to give trouble until the tonsils are removed.

Mrs. B., aged twenty-two years, a patient of Maurice Goldberg, Philadelphia, consulted me August 25, 1921, because of multiple abortions. She had been married two years, and six months after marriage had aborted a dead fetus, which the physician said was about six months of age. The second abortion was at three months and the third at six months. Her history was singularly devoid of complaints, persistent constipation and an occasional headache being the only deviations from good health. She had gained thirty pounds during her first pregnancy and

forty pounds with her second pregnancy, and now weighed 205 pounds. There was no complaint of pain and no history of bladder trouble. The teeth showed a number of extractions, gold caps and bridges, and a bad pyorrhea of the lower incisors. Blood pressure 135/84; Wassermann negative. There was tenderness over both ureters with a desire to void on pressure in the broad ligament regions. The urine was heavily loaded with pus and colon bacilli and showed a ring of albumin over one centimeter deep. The intramuscular phthalein test yielded, first hour 210 c.c., 20 per cent; second hour 410 c.c., 15 per cent. Renoureteral investigation showed bilateral pyelitis, the left pelvis holding about 13 c.c. There was definite stricture on the left side about 2.5 cm. above the bladder, while the only infiltration demonstrated on the right side was in the bladder wall region.

After two dilatations on each side a bilateral functional test on September 30, 1921, showed after intravenous injection an appearance time of R., 4 minutes, L., 5 minutes. Amount in half an hour R., 65 c.c., 19 per cent, L., 30 c.c., 22 per cent. The patient returned November 2, 1921, when the uterus was apparently two to two and a half months pregnant. The third dilatation on each side was given in November and the fourth in January, 1922. The urine showed an improvement but there was still albumin, and each kidney yielded pus and a positive culture. In June, a 9-pound boy was delivered and I heard several months later that both mother and child were doing well.

Just recently, in writing the chapter on the Ureter for the second edition of Cabot's *Modern Urology* I estimated that "my cases of pyelitis of pregnancy and of the puerperium since beginning stricture work, number approximately thirty with perhaps twenty-five showing ureteral stricture."

On receiving the invitation to address this Society, I at once began a classification of my cases of pyelitis of pregnancy, and found that my records show thirty-five cases, with notes on the presence of ureteral stricture in all but one. The discrepancy between the actual records and the estimated figures for Cabot's *Urology* are to be explained as follows. During the accumulation of the records on these thirty-five cases I have seen probably five or six for whom I made no records. These patients have been seen in consultation with obstetricians, the acute pyelitis seemed to be running a normal course, and the advice has been to continue the usual line of expectant treatment for such cases. Presumably, such patients have gone through an acute pyelitis and I have not been called to see them again, and have therefore made no record. On the other hand those patients who continued to have pyelitis symptoms, or who later developed another attack of pyelitis, have been referred to me for active urologic treatment with the consequent recording of their histories. In such cases the presence of ureteral stricture has probably been the chief factor in the onset, persistence or recurrence of the pyelitis of pregnancy and accounts for the high percentage of stricture cases in my records.

I shall have to defer for future publication quite a few interesting facts to be developed from an analysis of the records associated with this group of thirty-five cases, including the after-history or end-results, in all those whose records we may be able to trace.

We have sufficient data from which to make a few important generalizations, which we are confident will be verified by the work of others in the future.

It is probable that the stricture in most of these cases is present before the incidence of pregnancy. A careful inquiry will at times elicit a definite history of previous stricture symptoms, such as pelvic pain or discomforts, backache, and intermittent bladder distress. As stated above, stricture may be present with absolutely no symptoms until some unusual event, such as a fresh focal infection, an unusual exposure or trauma, or the incidence of pregnancy, causes such changes in the previously dormant stricture area, as to result in the suddenly acquired pyelitis, or in stasis symptoms without the presence of urinary infection.

A pyelitis primarily due to stricture may clear up spontaneously even though the kidney and ureter are under the added burden associated with a pregnancy. Some patients with a pyelitis of pregnancy and in whose cases stricture is found, give a clear record of having had a pyelitis in a previous pregnancy and a symptomless period with normal urine in the interval. In such cases the stricture probably antedated the first attack of pyelitis. We see not a few nonpregnant cases with symptoms of a recently developing pyelitis, or of severe kidney involvement found to be associated with a hydronephrosis or a calculus, in which investigation shows the underlying factor to be ureteral stricture; and such patients give a history of not having had similar symptoms before, except during a pregnancy. One might argue that such illustrations mean that the former pyelitis of pregnancy had led to an ulceration of a local area in the ureter which later had resulted in the stricture leading to a subsequent attack, but a careful study of many hundreds of stricture patients does not favor such a view.

A tradition now being handed down in the literature is that patients who develop a pyelitis of pregnancy associated with a widely dilated pelvis and ureter show on the pyeloureterogram a prompt restoration to normal after delivery. I have not had sufficient experience with pyelitis of pregnancy unassociated with stricture to pass judgment on this view, but I am showing you a number of pyeloureterograms taken at intervals after pregnancy which thoroughly refute this tradition as applied to pyelitis of pregnancy cases associated with ureteral stricture.

In the very recent literature there have been shown pyeloureterograms in support of the traditional view, in some of which there is distinct evidence of the persistence of a considerable dilatation of the tract after delivery, although it may not be so marked as during the pregnancy. In some others the postpregnancy films show an irregular and indistinct outline of the pelvis and ureter, suggesting a dilated

condition which has not been pictured because of lack of filling by the shadowgraph material. The use of the bulb test would undoubtedly show stricture in most of these cases.

An interesting point of great practical value is that it is not always necessary to treat a pyelitis of pregnancy kidney until we get entirely rid of the infection.

If we dilate the stricture area at ten-day intervals until the patient has no further chills and fever, even following the trauma of dilatation, we may cease treatments and give the patient a fairly good prognosis for carrying through to term, even though the urine may still show an infection.

There has been much controversy in the past concerning the best drug for washing out the pelvis in chronic pyelitis. I find that the chief requisite is to establish good drainage, because in most cases the kidney will then promptly get rid of its infection without the aid of drugs by mouth or by direct renal lavage.

Herewith are presented a few of the more convincing pyelouretero-grams together with brief case records to illustrate some of the above conclusions.

Fig. 1.—Mrs. M., aged twenty-eight years, first seen November 23, 1919 with John Bishop when her first child was one week old. Her temperature was 103.5° F. and the right flank was distended by an extremely sensitive mass considered to be an enlarged right kidney lying completely below the costal border. The patient gave a history of having had symptoms due to floating right kidney for six years, and this was the third very bad attack in that time. The urine showed albumin, casts, pus, blood and bacteria. This pyelitis attack subsided under medical, dietary and postural treatment. The patient came to my office four months later, when investigation showed a right kidney pelvis of 58 c.c. capacity and a decidedly purulent urine containing a colon bacillus infection. The wax-bulb showed two stricture areas in the lower ureter. Three dilatations were made in one month, carrying the stricture areas to 5 mm. In the next year the patient made a most satisfactory gain in general health but was still threatened with Dietl's crises after being on her feet overmuch. Capacity tests and pyeloureterogram showed a tendency to trapping of the fluid when the pelvis became full, and we decided to perform a nephropexy to overcome the secondary pathology resulting in stasis at the uretero-pelvic region. This became imperative when the patient again became pregnant and we operated in the third month of pregnancy, doing a fixation of the kidney in a high position. In December, 1921, Karl Wilson reported that she went through her labor and puerperium without fever, the urine showing a slight increase in pus and albumin for a few days before delivery, and the patient complaining of slight soreness in the right kidney region for a day or two after.

The patient had trouble with domestics during her puerperium and was obliged to overdo physically and while investigation showed that the urine from the right kidney had completely cleared of its infection and pathologic elements since the kidney fixation, she developed such serious symptoms by the time her baby was four months old that I was obliged to operate again. The upper ureter had become densely bound to the posterior abdominal wall and to the enlarged pelvis in a manner to form a vicious angle with obstruction. A plastic operation was quite successful and the patient has remained symptom-free and has normal urine. She

has gained in weight from 126 to 141 pounds and says she is in better health than ever before. It was especially indicated that this kidney be saved because the left ureter was the seat of two strictures, and the left kidney, although symptom-free, had a two hour phthalein output of but 25 per cent.

Fig. 2.—Mrs. P., aged thirty years, was admitted to the Hebrew Hospital April 5, 1919, in the third month of her fifth pregnancy, complaining only of a marked hematuria of five days duration.

Fig. 1.

There was complete absence of pain, temperature of 101° F., and the urine was the color of black coffee.

On cystoscopy the urine from the left ureteral orifice was clear macroscopically, that from the right looked like dark blood. Stricture was found 2 cm. above the ureteral orifice, and the right kidney and ureter held 200 c.c. The urine from the right side contained much blood, a fairly large number of leucocytes, and culture developed a pure colon bacillus growth. The bleeding ceased after three dilata-

tions of the right ureteral stricture within a month. Three more dilatations within the next month carried the stricture up to a 5.6 mm. bulb. The pregnancy had then advanced to the sixth month, and she had an uneventful term delivery October 25, 1919.

This roentgenogram was taken two years later. Note the calculus opposite the fourth lumbar vertebra. It was displaced from the stricture area by the ingoing catheter. Note the 35 c.c. of NaBr settled in the lower ureter. The kidney and ureter held 70 c.c. and 35 c.c. of water had first been injected. This was apparently displaced upward by the heavier NaBr.

Fig. 3.—Left pyeloureterogram of same patient illustrated by Fig. 2.

This was taken February 8, 1922, over two years after the patient's delivery.

Fig. 2.

This left side had been symptomless and it was investigated because the manifestly damaged right side had always yielded the higher phenolsulphonephthalein output. Pelvis and ureter held 60 c.c. Note the upper ureter displaced along the outer border of the psoas iliacus muscle and the sharp right angle turn in the ureter at about the pelvic brim region.

Fig. 4.—Bilateral stricture of the ureter, bilateral pyelitis of pregnancy and of the puerperium. Mrs. McC., aged thirty-one years, referred by L. F. Cosby of Abingdon, Va., in September, 1920. She had had four children, the youngest being four weeks old. There had been no trouble with her first three pregnancies. Throughout this last pregnancy she had not been well, being troubled chiefly with nausea, and for two months before the birth of her child she had had attacks of pain in the back and vomiting spells. After the birth of the child there was still much backache and there were severe attacks of pain situated chiefly under the

right shoulder blade with chills and fever, the temperature reaching from 103°
to 104° F. At first these attacks were thought to be due to the gall bladder, but
when pus and bacteria were found in the urine the diagnosis was changed to
pyelitis. Investigation showed bilateral stricture with bilateral colon pyelitis. The
right side held 55 c.c. and the left side 12 c.c. Five dilatations of each side, the
bulb being carried up to 5.5 mm., resulted in complete clearing up of the leucocytes
and in a negative culture with complete disappearance of the patient's symptoms.
The patient was in the hospital five weeks, gaining ten pounds in weight, and
eight weeks after returning home she wrote that she was feeling well in every way
and had gained six pounds. The x-rays showed a marked abscess formation about
several teeth and these were to be extracted after she returned home.
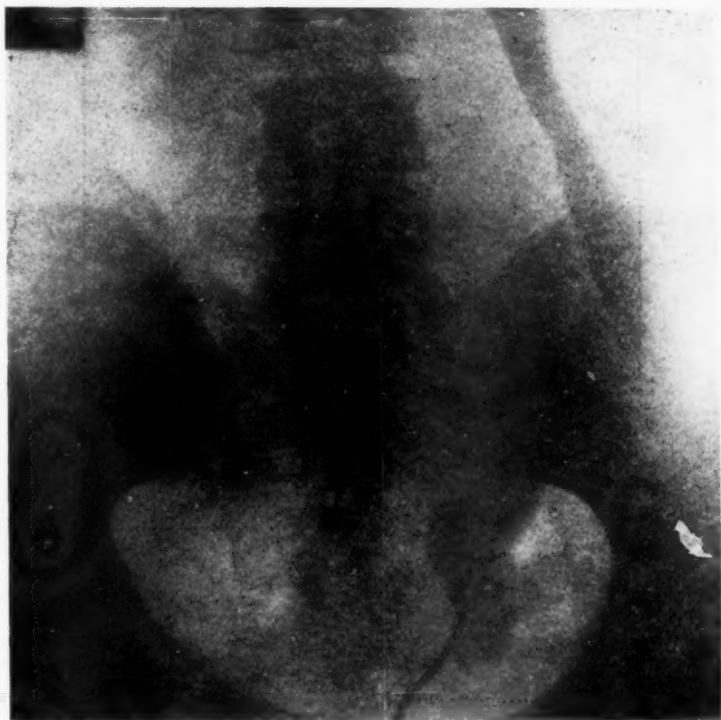
Fig. 3.

Fig. 5 illustrates same patient as Fig. 4. Note the strictured area in the iliac
gland region. The wax bulb placed 10 cm. back of the catheter tip hangs at a
point 8 cm. above the bladder and drags through a diffuse stricture area.

Fig. 6, showing left kidney and ureter holding 210 c.c. Ureteral stricture 15
mm. above the bladder opening. Mrs. K., aged 25, 2-para aged six and three
years, entered the Hebrew Hospital in November, 1922, because of an acute lobar
pneumonia. During her convalescence she developed an acute colon bacillus pyelitis
on the left side, this being the first indication of urinary tract disease. Note
the extreme dilatation of the ureter and of the calices with very little dilatation
of the pelvis. Note the comparatively thick cortex of the lower pole. Three dilata-
tions carrying the stricture area up to a 4.5 mm. (14 Fr.) bulb. Complete dis-
appearance of the symptoms. Infection still present. See Fig. 7.

Fig. 7 represents same patient as Fig. 6. The patient returned August 17, 1923, stating that her last menstrual period was June 6. She was not complaining of symptoms and came to ask whether it would be safe for her to carry through a pregnancy. With her two former pregnancies she began vomiting as soon as she became pregnant. With this pregnancy she has had no vomiting and scarcely

Fig. 4.

any nausea. Color excellent, weight 155 lbs. Says that since her treatments eight months ago her menstrual periods, which previously always came too soon and were very painful, have been coming on time and without pain. Examination—uterus of apparently 2 months pregnancy size and consistency. Two-hour intramuscular phthalein, output 45 per cent. Bilateral ureteral stricture. On September 19, the left kidney and ureter were found to hold 160 c.c. The differential phthalein test, one hour, intravenous, showed left kidney 10 per cent, right kidney, (transvesical) 53 per cent. This pyeloureterogram of the right kidney shows a slight dilatation of 15 c.c. The ureter shows slight dilatation from the ureteral stricture

area, located 2 cm. above the bladder, throughout its length to the kidney. No infection on the right side. Colon bacillus infection still present on the left side. After two dilatations of each stricture area the pregnancy continued without unusual symptoms, and in March, 1924, the patient had a normal delivery of a child weighing over seven pounds.

Fig. 8.—Note the moderately dilated pelvis and the tortuous and much dilated right ureter. Mrs. S., aged twenty-eight years, 2-para, entered a hospital in April,

Fig. 5.

1922, with an acute attack of pain in the right side. She had never had pain or backache before. An investigation resulted in a diagnosis of right hydronephrosis and hydroureter due to ureteral stricture. A twenty-minute functional test after intravenous injection of phenolsulphonephthalein yielded 12 per cent from the right side and 22 per cent from the left. Both sides were negative for pus and on culture. With these data and without further attempt to relieve the patient by giving good ureteral drainage, a right nephrectomy was done.

Fig. 6.
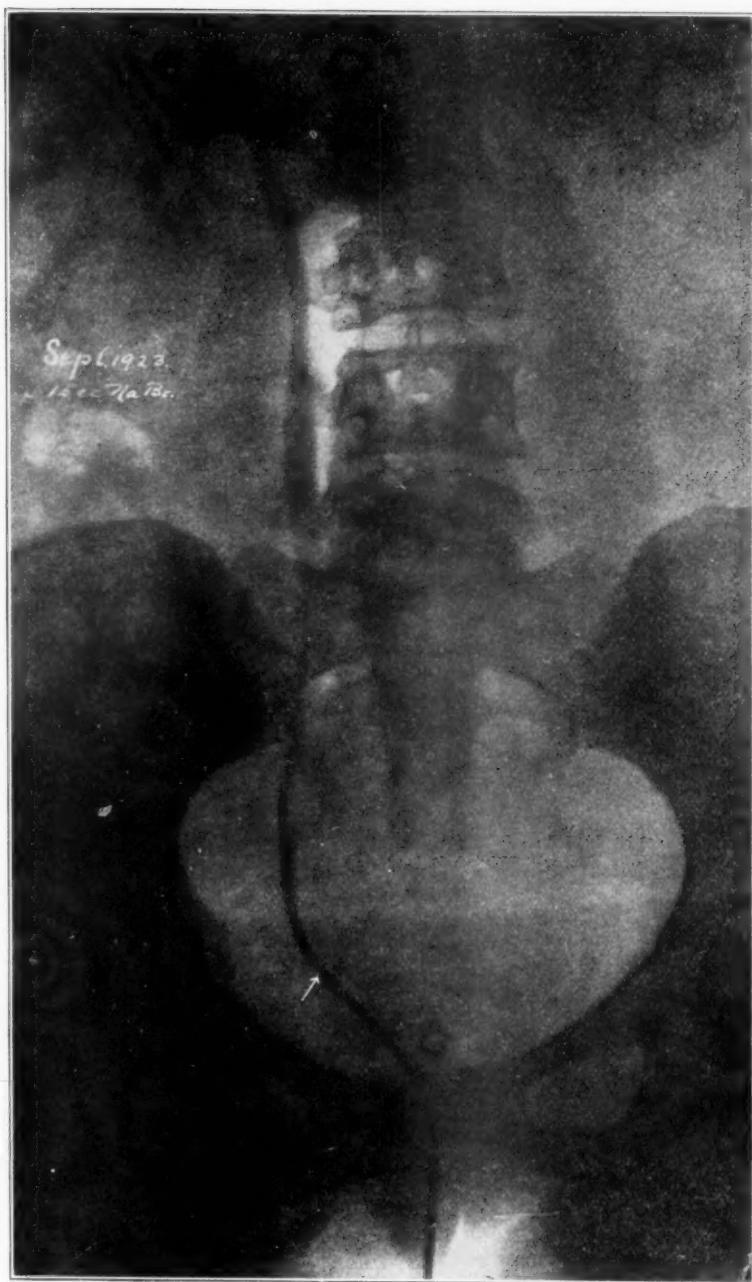
Fig. 7.

Fig. 8.

Fig. 9.

Fig. 9, illustrates same patient as Fig. 8. The patient consulted me in April, 1923. She was five months pregnant and was beginning to complain of severe pain low in the left pelvis and in the left kidney region. Note the diffuse shadow of the large uterus, the vertebrae of the fetus on the left, the stricture area near the bladder with the slightly dilated ureter from this point to the kidney. The pelvis is no larger than one would expect in a kidney with compensatory hypertrophy. The shadow of the abdominal ureter is very faint, possibly due to the compression of the pregnant uterus. She had been advised to have a cesarean section and amputation of the tubes for sterilization. A two-hour phthalein test yielded 1025 c.c. of urine with color output of 65 per cent the first hour and 20 per cent the second hour. After three dilatations of the stricture area the patient was greatly improved, and she was then referred to Dr. Williams' obstetrical department where she had an uneventful delivery at term. From our knowledge gained in reading pyeloureterograms, we feel quite certain that the patient could have been restored to health by simple dilatations of her right ureteral stricture, and one could not ask for a better demonstration of the value of conserving both kidneys when possible.

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TWO YEARS' EXPERIENCE WITH THE COMBINATION TREATMENT OF SURGERY AND RADIUM RAYS IN CASES OF CARCINOMA UTERI

By Gustav Seeligmann, M.D., New York City

(From the Gynecological Service of the Lenox Hill Hospital)

IN 1920. I observed three cases of carcinoma, two of the collum uteri and one of the clitoris, which showed recurrences after six or more years. The two cases of carcinoma of the cervix belonged to a series of radical hysterectomies of the Freund-Wertheim type with isolation of the ureters, excision of the parametrial tissues and a large portion of the upper vagina. These results were so disappointing that I determined to combine rational surgical procedure with radium therapy in the attempt to improve the immediate and late results.

While x-ray therapy has been studied more extensively in Europe, the development of radium therapy has occurred chiefly in this country. The gamma-rays of radium have the power to destroy dividing and abnormal tissues in dosage that will not materially affect normal tissue cells. It is through this action that carcinoma cells are specifically destroyed.

It is to be regretted that several unfavorable factors have hindered the development of radium therapy in this country and its critical, conservative and scientific study. Among these factors are: (1) deficiency of the knowledge of the physics of the action of radium; (2) insufficient quantities of radium used by many investigators, results being reported after the use of as little as 100 mg. or even 50 mg.; (3) unreliable reports of poorly studied cases which even reached the lay press; (4) the prejudice of general surgeons whose reports

discourage radium treatment of carcinoma as a general subject without specification of type or location.

It is my opinion that carcinoma of the cervix should receive individual attention when considering the subject of radium therapy in the carcinoma field. These cases present themselves to the surgeon in an advanced stage, a high percentage even inoperable, due to the slight character of early symptoms and the tendency to early invasion of the parametria and the lymphatics. The radical operations are difficult and dangerous, the immediate mortality rate being very high and the late results unsatisfactory. The disparagement by the surgeon of
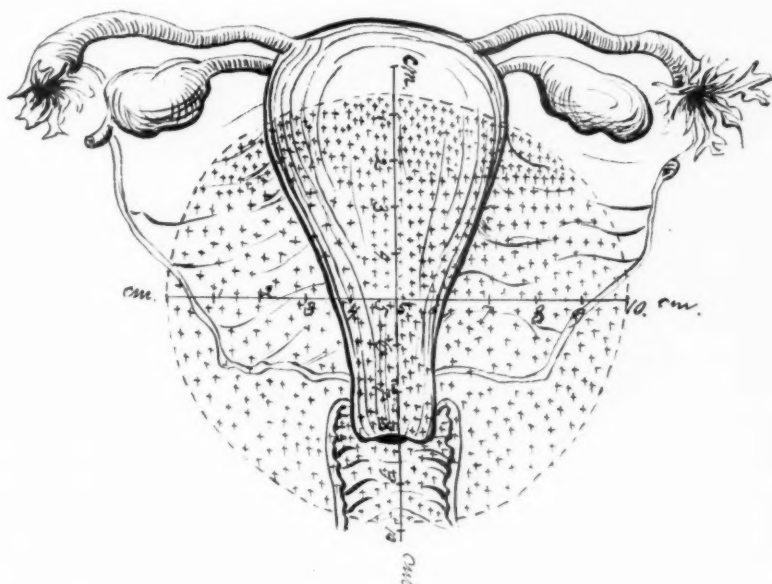
Fig. 1.

the use of radium therapy in cancer generally, should not be applied to carcinoma of the cervix until better operative and postoperative results can be obtained.

Between the end of 1921 and April, 1924, I have the records from my service in the Lenox Hill Hospital, of twenty-seven cases of malignant growths of the female genital organs, all of which received my personal care and treatment. It was clear to me from the beginning that the radium therapy should be applied by a specialist who had sufficient quantities of radium at his disposal, who was a physicist and mathematician and who had a proper knowledge of biology and pathology, to make it possible to discuss the many problems which would arise. This was done by Dr. I. Levin, Director of the New York City Cancer Institute and Chief of the Cancer Division of the

Montefiore Hospital in New York City. A careful study of a series of cases, even if comparatively small, must lead to a better, clearer and more reliable scientific result than the superficial and unreliable collective reports which we have had so far.

All cases were carefully studied before treatment was instituted. The following routine was observed:

1. Admission of patient to hospital.
2. Thorough history and general physical examination.
3. Special examination for metastases, especially in abdominal organs, skeletal x-ray pictures, etc.
4. Thorough gynecologic and rectal examination in conjunction with the radium therapeutist to determine plan of treatment. Cystoscopy and examination under narcosis if necessary.
5. Wassermann test, smears and blood counts.
6. Biopsy and pathologic examination of tumor tissue.

It is important to consider each case individually as each presents its own problem. After obtaining an exact idea of the shape, breadth, height, depth, direction and extent of the invasion of the tissues, the plan of procedure was determined; surgery, radium, x-ray, alone or in combination to obtain the best results.

As a matter of principle, I have ruled during the past two years, that cases which seemed to present a fair chance for removal of all of the diseased tissue should be considered operable and that the operation should be the primary procedure. For such cases I have abandoned the radical Freund-Wertheim operation and have done the typical panhysterectomy followed by this procedure: After the uterus, adnexa and upper vagina have been removed, the broad ligaments and the vagina are open. The radium therapeutist in sterile gown, gloves, etc., stands next to the operator holding a metal container in which is the radium substance or emanation, and to which is soldered a thick copper wire. The container is covered with a sterilized plastic material. This is placed into the area formerly occupied by the cervix and the intestines; the bladder and other organs are protected from the action of the rays by inserting a specially prepared eight layered gauze tampon ten yards long and six inches wide around the container. The abdominal incision is partially closed leaving an opening through which protrude the copper wire and the end of the tampon, and which is large enough to allow their subsequent removal. The patient returns to bed and the container remains in position for the time necessary to give the proper radium hour dosage after which it is removed by traction on the wire. The gauze is likewise removed and the opening in the abdominal wall is closed by tying silkworm gut stitches which were placed loosely in the wound at the operation. The wound heals by primary union.

If the conditions in a case are such that they do not permit the performance of this operative procedure, operation is performed with the purpose in view of applying radium emanation in the form of needles.

It is important in this connection to understand that the gamma ray will destroy carcinoma cells at a distance not greater than 3 to 3½ cm. This was demonstrated at the Berlin University in 1921. It is evident that treatment of carcinoma of the cervix with radium or its emanation will be ineffective if applied only to the vagina or cervix. An area with a 3 cm. radius from the external os as a center will not include the involved tissue. The region which is the object of therapy includes the upper vagina, the cervix (vaginal and supravaginal portions), lower uterine segment, the parametria and the iliac and hypogastric lymphatic nodes, an area with a diameter of ten cm. or more. The distance from a cauliflower-like growth to the base of the broad ligaments may be six to eight cm.

It was only logical therefore that in 1920 the radium therapeutists had begun to attack the involved area from above, i.e., through the abdominal cavity, as well as from below.

In this series of cases we have from the beginning established and maintained the principle of concentric attack. In the cases in which laparotomy was performed, the following technic was observed: Median longitudinal incision, protection of the intestines and bladder and free exposure of the uterus, adnexa and ligaments for examination. The patient was placed in exaggerated Trendelenburg position. The plan of treatment depended upon the topography of the case, the extent of the involved area, the location of involved lymphatic nodes and metastases, etc. The entire involved area was treated by inserting radium emanation needles in the form of minute capillary glass tubes. The dosage varied with the extent of the lesion, usually 4-9 mc. in 8-12 needles. The abdominal cavity was then closed by insertion of layer sutures without drainage. The needles remained permanently in the tissues. They cause no sequelae and in cases which were subsequently operated upon, were found encapsulated in the tissues. After abdominal closure, vaginal needling was done. The needles were inserted into the cervix, both from the vaginal surface and via the cervical canal, into the parametrial tissues and when necessary into the vaginal wall. In cases, when the patient's condition was poor, due to the effects of the laparotomy or cachexia, the vaginal needling was postponed for a few days. The vaginal dosage was about the same as the abdominal.

Other cases were first needled from the vagina and then after waiting six or more weeks, panhysterectomy was done.

Since the time of Cohnheim we have known that certain irritants such as heat, cold, chemicals, ultraviolet rays and x-rays are able to

produce changes in tissues which are characteristic of inflammation of an aseptic or noninfectious origin, namely diapedesis, migration of leucocytes through the walls of small blood vessels and formation of exudates. It is a fact of the greatest clinical importance that after the application of the gamma rays, a most violent reaction of this type occurs. This phenomenon requires more careful and extensive study. Clinically we have observed the following symptoms of a generalized body reaction. At times, high temperatures even 105° to 106° F. occur, of a remittent or continuous character with or without slight chills. Severe pain in the lower abdomen, continuous or spasmodic. Occasionally nausea and vomiting independent of the postoperative vomiting. In some cases decided prostration and syncope. The pulse usually corresponds to the temperature but we have observed small, rapid pulse when the temperature was not high. The duration of this reaction period also varies greatly, not always in proportion to the amount of radiation. We have seen very severe reaction in some cases after needling with comparatively small quantities through the vagina alone. On the other hand, in cases of extensive abdominal needling, we have seen some in which there was almost no reaction. This clinical picture reminds one of what the Germans call "Roentgen-Kater" and yet it is different. The blood is tested routinely before and after each radiation and shows almost regularly a hyperleucocytosis which is used as an indicator of the degree and duration of the reaction. The blood picture returns to normal but no further radiation is attempted until this occurs.

If, after the acute reaction has clinically ceased, the abdomen is opened for the hysterectomy, especially if done too early as in one case at six weeks after the intraabdominal needling,* the following picture is seen. The parietal and visceral peritoneum of the entire minor pelvis is dark red. The peritoneum covering the uterus, broad ligaments and bladder are equally affected. The dark red peritoneum may be covered by a peculiar plastic exudate which is not purulent and which is bacteriologically sterile; a serous fluid, in places coagulated. After cutting the peritoneum, as in separating the bladder from the uterus, the subperitoneal tissue is found to be filled with bloody serum which wells out the moment the peritoneum is incised. The extraperitoneal tissues of the broad ligaments are similarly affected. In one case, S, No. 3 of my series, the uterus, adnexa, broad ligaments and intestines were matted together by plastic exudate as in cases of infectious peritonitis. The adhesions had to be separated by means of finger and scissors.

Vaginally the reaction to the rays is the production of a pro-

*After this case was operated upon, it became known that at least three months should elapse before hysterectomy.

nounced tissue necrosis in the carcinomatous tissue.   A very profuse, foul-smelling, sero-purulent discharge occurs which soon diminishes and ceases after two to three weeks.   A dark red, granulating cavity remains which, after ten to fourteen days shows marked contraction in size with the formation of new fibrous connective tissue.   In cases which presented a large, inoperable, exuberant, cauliflower-like growth of the cervix, as much as possible of the tissue was removed by knife, scissors and large curette, before needling was done.   Let me cite an instance of this character.   Two years and three months ago, I operated upon a patient whose case presented a cavity the size of an apple, extending far up into the left parametrium due to extensive carcinomatous necrosis.   During the curettage of this cavity, I momentarily expected to see the uterine artery spurt.   After ray treatment as described above, the patient made an uneventful recovery. Upon recent examination I found a smooth crater-shaped cavity to the left of the cervix, into which I could just introduce the tip of my index finger.   The patient is a laundress who works from morning to night, feels well, has slight discharge but no pain.   I wish to state emphatically that I do not present this case as a cure but, in a patient from whom I would have expected death long ago, the palliative results are very remarkable.

I have attempted to describe briefly the technic of ray treatment and its clinical manifestations as practiced on my service at the Lennox Hill Hospital in this series of cases.   The objects we have had in view are the following:

1. To employ the gamma-rays after hysterectomy in such manner that they can best exercise their cancer cell destroying power in reaching microscopically small nests of carcinoma cells.   It is logical to believe that the percentage of recurrences will be reduced.

2. To make operable by the use of radium some cases that seemed inoperable before its use.

3. In inoperable cases, to attempt to destroy all living carcinoma cells by the method of concentric attack and at least to retard the progress of the diseases and ameliorate the symptoms.

The results achieved seem to justify the method of procedure.   This paper was not written primarily for the purpose of reporting final results.   It proves nothing to state the fact that my first cases that were radiated before or after hysterectomy are today without recurrence as the time of observation is too short.   However, in eight cases we have seen but one recurrence and this not my own.   It is interesting to state in this connection that a case of carcinoma of the uterus which was exposed to the rays immediately after operation in February, 1920, is also free from recurrence whereas two similar cases in

which the patients were operated upon at the same time, have in the meanwhile died from recurrences and metastases.

I have heard the criticism expressed by a prominent surgeon that the treatment of carcinoma by the use of local ray application was useless as the condition was only the localized manifestation of a general systemic disease. I do not care to discuss this conception of carcinoma except to state that among radium therapeutists the opinion is gradually gaining ground that the curative effect of radium is not only local but systemic.

Be this as it may, in our method we have utilized the gamma-ray as we previously used knife or cautery, to mechanically destroy the carcinoma tissue as far as possible and to a wider extent than is done by the generally used methods of application.

On account of generally good operative results, carcinoma of the body of the uterus has not been treated with this method but simple panhysterectomy has been done. Malignant ovarian tumors and other carcinomata of the genital organs have been treated in conjunction with Dr. I. Levin but are not considered in this article. These cases will be reported at some future time.

CONCLUSIONS

1. This paper is written with the intention of presenting to my colleagues our method of using the gamma-rays of radium and asking them to try the method and seriously study the results.

2. It is logical to expect improvement in final results by the combined method of surgery plus radium. Our results have been interesting and encouraging.

3. In inoperable cases, radium is the therapy of choice and gives results as measured by marked clinical improvement and in some instances inoperable cases have been made operable, so that it is no longer permissible to say to a patient with inoperable carcinoma of the cervix, "I can do nothing for you."

4. Carcinoma of the collum uteri is a field of research in radium therapy in many ways specific in presenting a problem different from carcinoma in other parts of the body.

35 EAST EIGHTY-FOURTH STREET.

THE ELECTROCAUTERY IN THE TREATMENT OF LACERA-
TIONS AND CHRONIC INFECTIOUS DISEASES
OF THE CERVIX

By Hilliard E. Miller, M.D., F.A.C.S., New Orleans, La.

THE great majority of all women who have borne children have lacerations of the cervix, varying in degree from a slight nick to a tear which may extend up into the parametrium. Also a large number of nulliparous women have chronic infections of the cervix, varying from a slight leucorrhea to a persistent and profuse mucopurulent discharge. For this reason it is easy to understand why there is no structure of the body which has been the object of more surgical attention or whose treatment is more open to question. Amputation and trachelorrhaphy are the two standard procedures, but there are endless modifications of technic in each instance, and the question of when each operation shall be employed is still debatable ground for the reason that neither procedure even in the most skilled hands gives uniformly satisfactory results.

The origin of these conditions is easy to understand. In the multipara, where lacerations are in any way extensive, the resulting scar tissue interferes with the circulation in the tissues and drainage through the lymphatics, so that an almost chronic congestion results, which in turn predisposes to bacterial infection and inflammatory processes, often with marked cystic degeneration. These processes are responsible for nearly all leucorrheal discharges which do not arise from tubal disease or from pelvic exudates. Moreover, even mild lacerations, if the patient is examined eight or ten weeks after delivery, will show a surprisingly large percentage of eversions with erosions. Such conditions are, of course, nothing more than an outgrowth of columnar epithelium from the cervical canal, with a hyperplasia, which does not permit squamous cells from the outer side of the cervix to cover the raw areas. Chronic discharges follow and it is not infrequent, in examining such patients, to find the cervix bathed in a perfect puddle of mucopurulent material in the vault of the vagina. Such a condition, if not checked, results eventually in an inflammation or low grade infection of the endocervical glands, and because the lymphatic system of the cervix is continuous with that of the uterus and parametrium the infection may extend upward, with of course very much more serious results. In other cases the opening of the glands becomes sealed up and the mucoid material is

retained, thereby distending the gland to many times its natural size. This occluded mucus almost invariably becomes infected and therefore is a focus of infection to the entire blood stream. When these cystic changes do occur the circulation and lymphatic drainage is still further inhibited and there is still more eversion of the external os, until we sometimes find a cervix three or four times its natural size. We need merely to look at such a cervix, chronically inflamed and congested and pouring out a continuous mucopurulent discharge, to appreciate that it can easily be the source of a general systemic infection, quite as much as diseased teeth and tonsils. Indeed the condition is a good deal worse in looks at least than the average tonsil on which so much stress is laid.

In nulliparous women practically the same conditions are present except that the eversion it naturally limited by the fact that the cervix has not been torn. Many of these patients show a pathology which is undoubtedly the result of specific infections not recognized in childhood. In other instances, with constipation and general debility as predisposing factors, it is easy to see how the bacteria always present in the vagina may become active and give rise to an ascending infection. The endocervical glands become enlarged and are often chronically infected and distended with a mucoid or even a mucopurulent material, until the condition is just as much a source of distress and even ill health as in the lacerated multipara.

The standard operative treatment for these conditions in the multipara is either an amputation or a trachelorrhaphy. I have recently investigated a large series of such cases in private practice, which means that the patients were carefully selected and were operated on under the most favorable conditions, and I was astonished to find how large a percentage reported little or no relief from the operation. In every case the previous symptoms were about the same, a persistent and annoying leucorrhea for which no other pathology could be found, vague pelvic distress, nervousness, and frequently disturbed menstruation. In every instance the pathology was a laceration of varying degree, accompanied by erosion, eversion, often marked cystic degeneration, and practically always a profuse mucopurulent discharge. When amputation was the operation of choice less than 50 per cent of the patients were completely relieved. This operation was selected only in women near or past the menopause, 80 per cent of the group being over 40. In two instances it was done in patients of 35, but in each case there was an intractable discharge following a previous supravaginal amputation of the uterus in another service. The general opinion, which is substantiated by the results in our clinic, is that when amputation of the cervix is done in young women it almost invariably leads to disturbed menstruation, extreme nervousness and vague pelvic discomfort, particularly after

standing; also we have found that in these cases the uterus is rarely
of normal size or tone. Conception does not seem to be influenced
one way or the other, but premature delivery is rather frequent, and
if full term labor does occur it is usually rather tedious and accom-
panied, at least in my own experience, by postpartum hemorrhage or
unusually free bleeding.

In the series of trachelorrhaphies the results were very much
better. Sixty per cent of the patients were completely relieved, and
30 per cent were partially or temporarily relieved, leaving only 10
per cent who stated that they had obtained no relief at all. It was
interesting to note, too, that nearly a third of the patients relieved
stated that since the operation their general health was better than
it had ever been before, proving to my mind that a systemic infection
had been eliminated. Although some two-thirds of these repair
operations were done in women still in the child-bearing age the
percentage of subsequent pregnancies was very small, less than 10
per cent. There is no actual organic reason for this, and the only
way I can explain it is on the ground that the majority of these
women had already borne several children and were probably using
rigid contraceptive measures; indeed several voluntarily stated that
this was the case. When pregnancy did follow, labor as a rule was
somewhat prolonged, though not unduly, and in the majority of cases
there was no fresh tear. The general effect of trachelorrhaphy on
the whole is better than amputation; in the plastic operation the
normal anatomic pelvic relations are less apt to be disturbed and
the uterine body is protected against infection by a cervix of normal
size and length.

In a third group of cases where the patient was a nullipara or
where the tear was not extensive enough to demand a plastic opera-
tion simple cauterization was done, and in these cases the results
were surprisingly good. From 85 to 90 per cent were completely
relieved and in the majority of cases the patients stated that there
was a marked improvement in their general health.

Careful analysis of these figures seems to prove that relief of the
symptoms depends not so much on the repair operation or the am-
putation as on the clearing up of the infectious process in the endo-
cervix. Where we have failed it is because we have not realized
that the source of the discharge is the glands, which are either not
entirely removed or not sufficiently cleared out. The old nonopera-
tive methods tried to meet this condition and we all know how un-
satisfactory they were, office treatment with silver nitrate applications,
ichthyol and glycerine tampons, daily douches, rest in bed, possibly
some uterine stimulant such as ergot. These were the women—minor
gynecologic problems, if you will—who haunted our offices and event-
ually came to operation none the better but rather worse because our

temporizing measures had deferred radical treatment and allowed their condition to grow progressively worse. The repair work was eventually done in tissues congested, swollen, edematous and often chronically infected, so that faulty union resulted and the underlying glandular pathology was not corrected at all.

For the last several months I have been interested in treating such conditions in my office, particularly those following childbirth, with the electrocautery. At the routine examination about ten weeks after delivery there is often found a slight or moderate laceration with a mild degree of endocervicitis. I have already pointed out that if such a condition is allowed to persist it will lead ultimately to inflammatory changes with cystic degeneration and then to the whole vicious circle of distressing symptoms, and at last an operation with only partially satisfactory results. Recently in such cases I have been using a small electrocautery, similar to the one used by the nose and throat men, the degree of cauterization depending entirely on the degree of change which has already occurred. In the average case it means burning down the excessive granulations resulting from the eversion, which allows the squamous cells from the vaginal surface of the cervix to heal over the everted portion. If more than the average amount of trauma exists I make three or four linear incisions on both the everted anterior and posterior lips. This procedure is easily carried out after anesthetizing the affected area with a 4 per cent cocaine solution and inserting a small tampon of the same solution into the cervical canal for a few minutes, or it can be done without any anesthesia at all if the vaginal surface of the cervix can be avoided.

The patient is told to return in two weeks, at which time a similar treatment is usually given and she is discharged for six weeks. In the majority of cases at the end of this time the condition is practically normal except for the lacerations, which are not pathologic in themselves. The erosion has disappeared, the squamous epithelium from the vaginal surface of the cervix has spread over the everted areas, forming a smooth, glistening, healthy coat, and the discharge is practically gone. Subinvolution, which is associated with many of these conditions, is always markedly benefited. The condition is quite as healthy and the amount of scar tissue as little as could possibly be created by any type of plastic operation.

In some cases, naturally, too extensive a cauterization is necessary to permit of its being done at the office, in which case the patient is anesthetized at the hospital and the larger cautery used for a more extensive destruction of the glandular elements. If the tear extends up into the parametrium and is too extensive for simple cauterization to be effective, we have found that this treatment previous to the plastic operation puts the tissues in better condition for immediate

union with permanent results and reduces the chances of a chronic discharge by previously destroying the foci of infection.

There is much to be said in favor of the method. It is so simple and so free from after-effects that it is a reasonable office procedure. It spares the patient much inconvenience and suffering as well as the expense of a long hospital stay. It has markedly reduced the number of plastic operations we are performing and so far our results have been uniformly satisfactory. We are coming more and more to believe that in these conditions the best surgery is no surgery at all, and certainly we are laying less emphasis on the cases where operation once seemed inevitable. The method, of course, is not a new one; it was advocated many years ago by Hunner, and has been used in the operating room more or less ever since. With its application to office practice, however, I believe that we are in a fair way to relieve many more of our chronic cases with less inconvenience and expense to them and with more satisfaction to ourselves than was ever the case in the old days of local medications and extensive surgery.

I might say in conclusion that while radium is of distinct benefit in the treatment of chronic endocervicitis, its usefulness is limited strictly to cases in which it can be definitely determined that there is no latent infection of the tubes; unless this is kept constantly in mind very serious inflammations will promptly follow its use. The results are good in properly selected cases and with a carefully regulated dosage the menstrual cycle is not affected, but in no case are the results as prompt as with the electrocautery; hospitalization is always necessary, and the patient is subjected to more pain, inconvenience and expense than if she were treated by a simple cauterization such as I have described.

512 HIBERNIA BUILDING.

CURETTAGE WITHOUT ANESTHESIA ON THE OFFICE TABLE*

By HOWARD A. KELLY, M.D., BALTIMORE, MD.

THE rounds of our daily duties are an aggregation mostly of small things, while the big things, the dramatic episodes, are but occasional and relatively often of lesser importance. The elder Gross once said (and it had been said in well-rounded Latin phrase long before his time) to a lady apologizing for bothering him with her painful corns: "Madame, if I could but relieve all the corns in the world, I would consider my life well spent."

A big ovariotomy, that *pièce de resistance* of the surgeon of two generations ago, has become in our day almost a curiosity, so rare is it, but curettage to clean out the uterus and to establish a diagnosis is still with us like daily bread, and it is of this I wish to speak, simplifying, if I can, in some degree this commonest and safest of all our operations if, indeed, it justly deserves the name of operation at all. First, let me take a moment to justify its operative status as a sort of *mise en scène* for its technic which is to follow.

Curettage is just as definitely an operation as celiotomy, for it involves:

1. Surgical judgment as to its necessity.
2. Usually an anesthetic.
3. Use of sterile instruments of precision.
4. Dilatation of the cervical canal which is forcible and produces some rupture of fibers (occasionally extensive).
5. Use of the curette to remove the intrauterine tissues,—a bloody operation.
6. Sedulous care to avoid perforating the uterus.
7. Careful study of the tissues removed and an exact pathologic diagnosis.
8. Due respect to the after care of the patient.

That there are great, even lethal risks associated with unskilful work and sometimes even with skilful, the literature of the world abundantly proves. No man who has treated many patients has avoided perforating the fundus of the uterus with a sound, at some time or other.

In unskilful hands the uterus has even been bored through and placental forceps applied, the small intestine grasped and hauled out of the vagina and even (*mirabile dictu*), taken for some product of pregnancy, cut off and thrown into the bucket.

I have an as yet unpublished paper from Germany at present in my

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*Read at a meeting of the Philadelphia Obstetrical Society, January 3, 1924.

hands showing that there are an enormous number of unskilful criminal abortions now being done in that country with disastrous results.

I insist therefore that in order to safeguard the patients and to brand the doctor and the midwife abortionist responsible for most of the serious accidents, as well as to impress the doctor who may be disposed to act without due comprehension of the risks, it is necessary to continue to dignify this procedure as a definite act in surgery.

I propose to simplify this time-honored procedure in several ways, fortified by my personal experiences for some years past. In doing this I suggest a technie for the specialist, which I condemn for the general practitioner lacking special skill and experience. Let it therefore be made plain that I speak only to gynecologists and of curettage for diagnostic purposes.

The usual bimanual examination has been made, determining the size, form, position and mobility of the uterus, as well as the absence of any lateral pelvic disease. A history of hemorrhages,—periodic, irregular or persistent, or of unusual discharges, calls for the examination by curettage of the interior of the uterus.

To follow custom and send the patient to the operating room to be curetted under an anesthetic involves delay until the next meal time has passed and demands the return of the surgeon at a specified hour with a further wait for the hardening and staining of the specimen for microscopic examination. If I think that the patient will trust me and can exercise moderate self-control, I tell her I want to do a small operation which will save her much time, and enable me to reach a prompt decision, and that she will experience three hurts, but that I will warn her each time so that she can grit her teeth for a moment and bear it; while all will be over in one or two minutes.

The instruments, sterilized, always ready for prompt use in these cases include a retracting speculum, Sims type, long dressing forceps and some cotton swabs to cleanse the vagina, narrow anterior wall retractor, bullet forceps, uterine sound, dilator, curette, salt mouth bottle with 10 per cent formalin, and a vaginal pack in case of free flow.

The patient lies in the dorsal position on the examining table on a pad with legs well flexed on the abdomen. The Sims speculum is introduced and the posterior vaginal wall retracted. The upper vagina is quickly swabbed out with one or two cotton pledgets saturated with alcohol, taking care not to touch the vulva. Now comes hurt number one; the anterior lip of the cervix is caught with the bullet forceps and the anterior wall retractor removed. The sound is introduced to ascertain the direction of the cervicouterine canal. Then comes hurt number two; the dilatation of the cervical canal. This is by no means the thorough dilatation we make under anesthesia. The object being

solely to open it enough to introduce a very small curette. The last hurt is the curettage, easily done, covering rapidly the whole interior of the uterus, which is explored with the sense of touch transferred to the end of the curette, recognizing any soft, boggy, yielding parts or distinguishing that firmer, gritty, normal base, so definite that we can often declare at once with approximate certainty that the uterus is normal. It is not necessary to secure much tissue for the microscope. If there is any disease, it separates easily and is ejected or flows from the cervix and is put in formalin and handed over to the laboratory for sectioning and staining.

I have for years found that I can make most of my diagnoses with a pocket lens magnifying ten or twelve times, holding the slide up to a good light, but the microscope, of course, follows for detailed study.

I have seen no accidents following this procedure; the work is done in my examining room in my hospital where a patient could be sent at once to a bed and detained, if necessary. I have made innumerable examinations of suspectedly healthy uteri, many of carcinoma of the body and intracervical, and occasionally find retained decidual products. If an intrauterine polyp is suspected, one must then use a small narrow-bladed polyp forceps and try to grasp it. I never try to examine a very nervous patient in this way; indeed, if the patient cries out, I desist and make an appointment for a later complete examination under anesthesia. Also some canals are so wide open that it is a matter of extreme simplicity to curette, even without the knowledge of the patient. I rarely curette a young, single, or nulliparous woman in this way. Curiously enough, patients have repeatedly requested me to omit an anesthetic. By this procedure I do miss the deeper, more complete examination of the lateral structures by the rectum, often so important as not to be passed over, but I save myself and suitable cases much time and carry my diagnoses through quickly, thereby sparing patients the fear, unpleasant anticipations, discomforts and added expense of a gas examination. Judiciously used, I believe this procedure will prove a boon to our specialists and I hope to them alone.

1418 EUTAW PLACE.

A CASE OF TRUE HERMAPHRODISM*

By James C. Masson, M.D., Rochester, Minnesota

(From the Section on Surgery, Mayo Clinic.)

CASES of true hermaphrodism are exceedingly rare, and in the search of the literature I have not been able to find the report of a single case of true bilateral hermaphrodism. There are a great many reports of cases of pseudohermaphrodism. True hermaphrodism
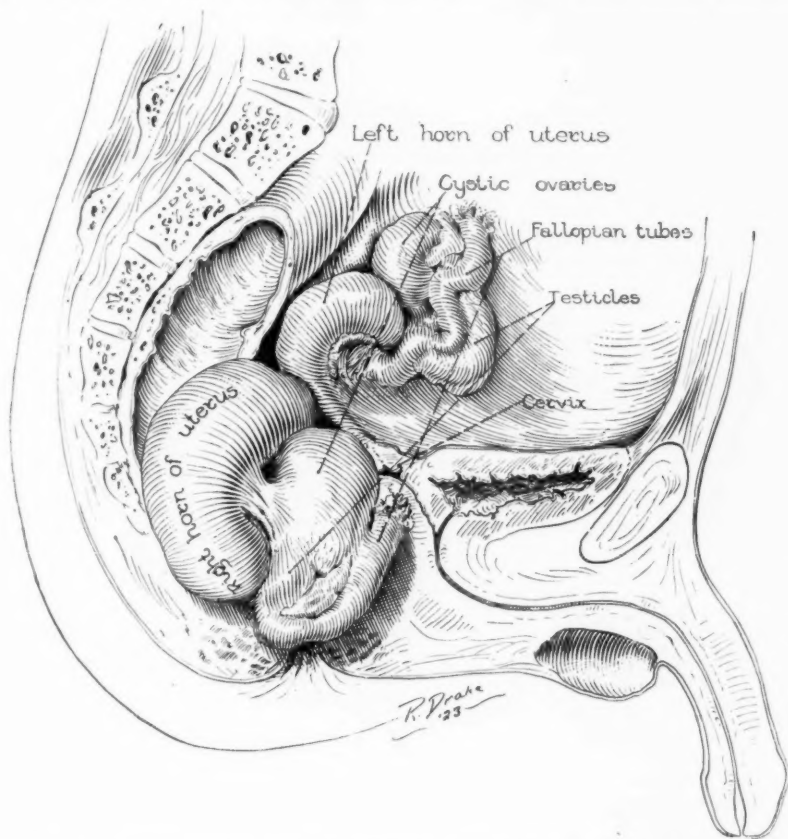
Fig. 1.—Diagrammatic anterior posterior section through the pelvis. True hermaphrodism (Case A404073).

has been classified in three groups by Klebs: (1) unilateral, in which an ovary or testicle is on one side, and an ovary and testicle on the opposite side; (2) bilateral, in which there is an ovary and testicle on
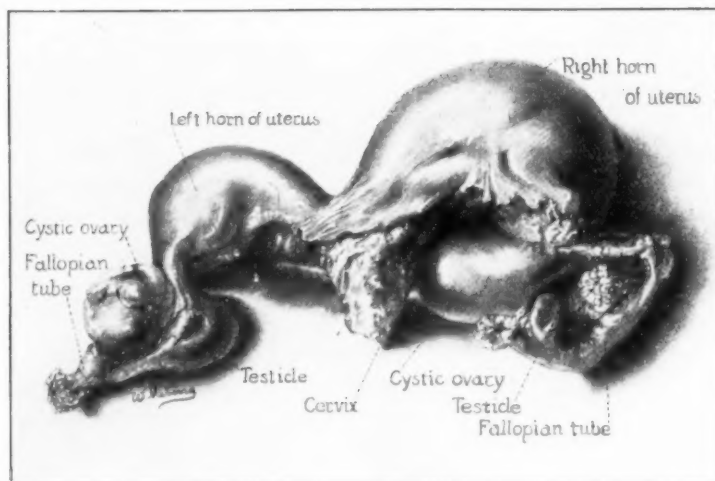
Fig. 2.—Specimen removed by operation showing the cervix attached to the urethra at the verumontanum, which was enlarged.
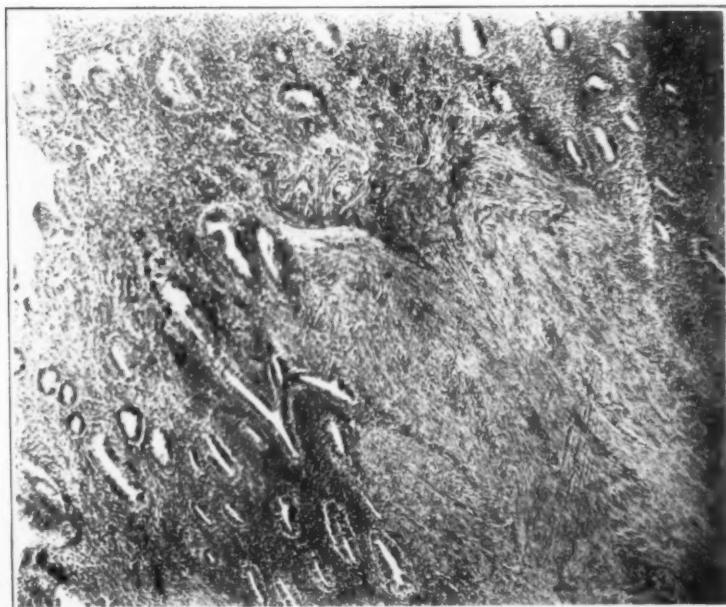
Fig. 3.—Section of uterus showing endometrium.

both sides, and (3) lateral, when there is an ovary on one side and testicle on the other.

The patient, F. V., aged forty years, apparently a male, came to the Mayo Clinic on account of recurrent attacks of lower abdominal pain associated with hematuria. He had been brought up as a boy, and his habits were distinctly masculine. He worked as a miner in Alberta and had served for five years in the British army during the war, as a driver of a motor truck. Spontaneous hemorrhage from the urethra had occurred at the age of thirty, and had recurred at fairly definite intervals of four or five weeks for ten years up to the time of his present examination. The bleeding was characteristic in that it appeared only during the act of micturition and was always terminal. The bladder would be emptied of clear normal urine, and in the effort to express the last few drops, a dram or two of pure red blood, followed by a varying amount of bloody mucus, would be expelled. The period of bleeding would continue for three or four days. The only associated symptoms at these times were a feeling of listlessness, and during the last four years, a severe stabbing pain in the left lower abdomen and groin, which would come on after the first appearance of blood and be repeated at frequent intervals during the next two or three days. The pain had recently become almost unbearable; it was never independent of the bleeding. Several examinations had been made, including cystoscopy, and the source of hematuria was believed to be a "spot" in the bladder, and possibly the left kidney.

The patient was slender, with the face of a rather mild-tempered man. He had scarcely any beard. His body resembled that of the female, with rather small shoulders, broad hips, transverse pubic hair-line, well-developed nipples, moderate-sized breasts which appeared to possess considerable gland structure, and absence of hair on the chest. No testicles could be felt in the scrotum. The penis was of normal shape and structure, but rather small. On careful palpation, there was demonstrable in the left renal area a mass, which apparently moved with respiration. No prostate or seminal vesicles could be felt by rectum, but an irregular shaped mass which was slightly movable could be felt in the pelvis.

The systolic blood pressure was 118, the diastolic 74, the pulse was 72, and the temperature 99. Urinalysis between spells was normal, save for a trace of albumin and a very few pus cells. The hemoglobin was 71 per cent, erythrocytes 4,200,000, leucocytes 5,400. The Wassermann reaction was negative. There was a combined phenolsulphonephthalein return of 40 per cent in one hour and fifteen minutes. The blood urea was 16 mg. for each 100 c.c. of blood. Roentgenograms of the kidneys, ureters, and bladder were negative. Cystoscopic examination between spells of hematuria revealed a normal bladder. No right ureteral meatus could be seen. The left ureteral meatus was normal and the secretion from the left kidney was clear. The left ureter was catheterized and was of normal length. The catheterized specimen from the left kidney contained a few red blood cells, believed to be due to trauma. On account of the diagnosis made elsewhere that blood was coming from the left kidney the patient was advised to remain under observation until bleeding should occur. Cystoscopic examination at the time of the bleeding ruled out the kidney and bladder as the source; the blood was thought to enter the urethra in the region of the verumontanum. A differential functional test, phenolsulphonephthalein as the indicator, showed 15 per cent return from the left kidney and 15 per cent from the bladder in fifteen minutes. Indigocarmin administered intravenously gave a dark blue color to the secretion from the left side. No blue could be seen on the right side.

In view of the history of periodicity, the admixture of mucus with the terminal hematuria, the famale habitus, the well-developed breasts, feminine hair distribu-
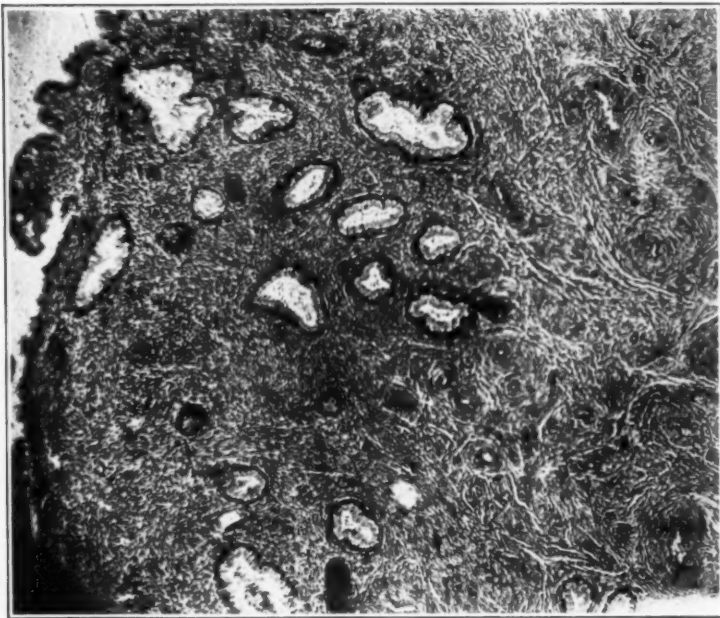
Fig. 4.—Section of cervix showing nabothian glands.
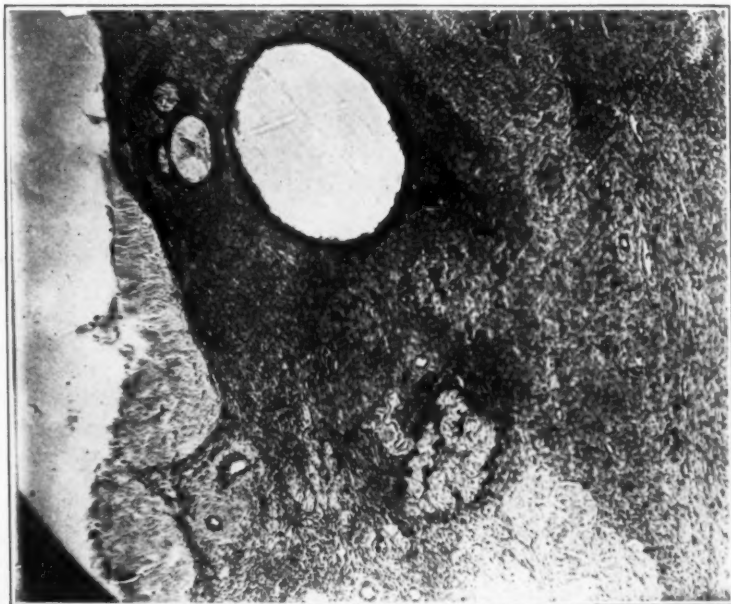
Fig. 5.—Section of ovary showing corpus albicans, with graafian follicles.
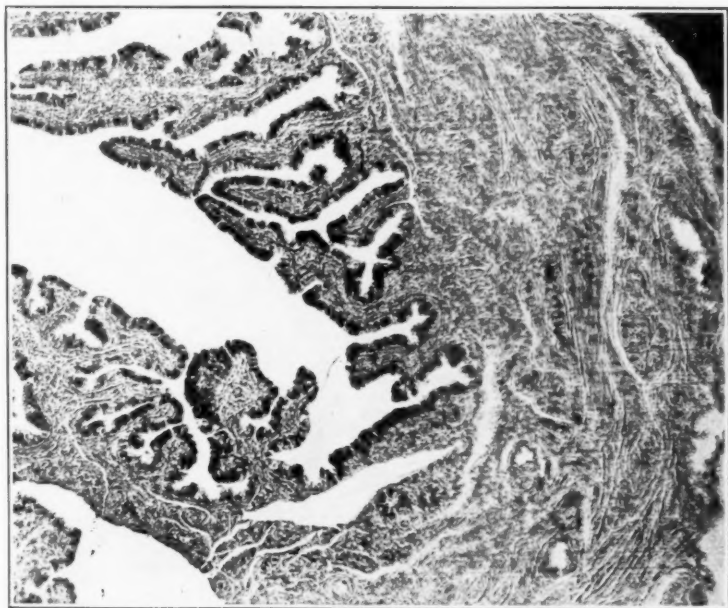
Fig. 6.—Section of fallopian tubes.
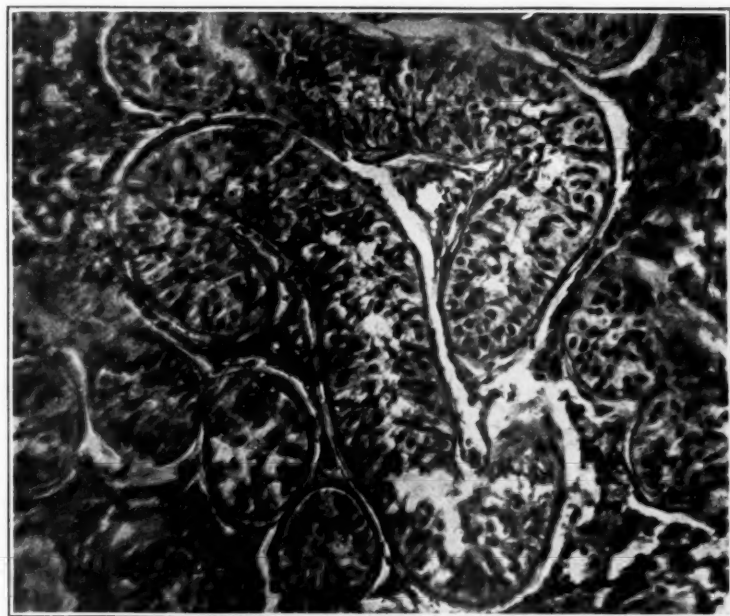
Fig. 7.—Section of testicle showing seminiferous tubules.

tion, apparent absence of prostate, small penis and empty scrotum, a diagnosis of congenital anomaly associated with the female generative organs was made and exploration advised.

At operation, October 11, 1922, a well-developed didelphic uterus, and bilateral tubes and ovaries were found. Both horns of the uterus were dilated with menstrual fluid, and were supported by well-defined round ligaments. It was difficult to determine whether or not a prostate was present. The broad ligaments contained small masses of tissue. The left kidney was markedly increased in size. There was no right kidney. A total abdominal hysterectomy was performed with the removal of both tubes and ovaries. The cervix opened into a small vaginal pouch which corresponded to the vagina masculinis and it was at this point evidently that the tract opened into the posterior urethra. At operation no testicular tissue was recognized, but the pathologist reported a bicornate uterus, a well-developed tube on the left, an incompletely developed tube on the right, normal bilateral ovaries containing cysts, and also considerable testicular tissue on each side with spermatozoa in the ducts (Figs. 1 to 7).

The patient was not told the details of the operation, but simply that a tumor causing the trouble had been removed. He had a normal postoperative course and was allowed to go home at the end of three weeks. Nine months later, he wrote that he felt well and had not had any more bleeding or pain, and was doing a man's work every day.

In handling cases of this type, I believe it is advisable not to confide in the patient too fully with regard to the operation. I had an unpleasant experience with a case of hermaphrodism or pseudohermaphrodism in which the external organs of both sexes were present. The patient had been brought up as a woman. I removed the testicles which were in the inguinal canal and a hypertrophied clitoris. This woman, a school teacher, had been apparently normal, although she knew there was some congenital anomaly. Before operation I explained to her what I would probably do, and she wanted it done, but for several months afterward she was much upset, and regretted that she had not elected to be made a man. She returned to see me once, and wrote several letters regarding the advisability of testicular gland transplants. I have kept her on ovarian extract, and she is apparently normal now, has distinctly feminine instincts, and is quite satisfied to be a woman. She has a small vagina, and I have consented to make a vagina by the Baldwin technic if she ever contemplates marriage. I believe she would have been saved much worry if I had not told her that she could have been a man.

THE ELIMINATION OF ECLAMPSIA AS A COMPLICATION OF PREGNANCY

By G. Brown Miller, M.D., F.A.C.S., Washington, D. C.

IT must be apparent to every careful observer that the responsibility of seeing a woman safely through her pregnancy is regarded too lightly by the majority of physicians who practice obstetrics. Nowhere is it more strikingly seen than in dealing with eclampsia and its preceding toxemia.

No woman *under the control* of an obstetrician should die of eclampsia. Should such a termination of preeclamptic toxemia ensue, it should be regarded as *prima facie* evidence of ignorance, negligence, or bad judgment on the part of the attending obstetrician. No excuse should be tolerated for negligence or ignorance. The position of the obstetrician who loses a case of eclampsia should be that of one convicted by circumstantial evidence and who can escape punishment only on the plea of bad judgment in the management of his case. Many cases will come under his care in which he cannot be held responsible; such as cases seen in consultation, those who disobey his instructions or those women who seek no medical advice until ill. My only fatalities in over 600 deliveries have been in this class of cases.

Eclampsia can be defined as the culmination of a toxemia occurring in the pregnant woman and usually accompanied by convulsions. Convulsions are not necessarily an accompaniment of the eclamptic state, as undoubted cases of eclampsia have occurred in which convulsions were absent, and on the other hand convulsions may occur in pregnancy, parturition, or the puerperium and be due to causes other than eclampsia.

Every obstetrician is familiar with the character of these convulsions. He is likewise familiar with the numerous theories concerning the etiology of the affection. These I will barely touch upon. The pathologic lesions found at autopsy upon women who have died of eclampsia have been carefully studied and seem to be quite characteristic of the malady. These lesions occur in the liver, and consist of thrombosis of the small blood vessels, hemorrhage into, and disintegration of, the liver substance at the periphery of the lobules. Changes also occur in the kidneys, brain, heart, etc. I will not go further into the pathologic features of the malady than to recall to your memory their extent by quoting a well-known book on obstetrics. "The lesions in the liver vary from congestion with fatty and granular

degeneration to necrosis with almost complete dissolution of the liver parenchyma * * * .'' The kidneys are swollen, the cortex thickened and pale, and the marking less distinct than normal. ''* * * The cells of the cortical tubules are swollen and in many places disintegrating. Other changes found are moderate fatty degeneration of the heart, and edema, congestion, and hemorrhages in the brain.''

It is to me almost inconceivable that these marked pathologic lesions found at autopsy could have been produced without a preceding toxemia, the evidence of which could have been discovered by the constant and careful observations of a competent obstetrician.

In the acute cases the toxemia may have been of short duration. The theory which seems to apply more nearly to the causation in these cases is that the toxemia is due to a placental infarct, which is frequently caused by, or causes separation of the placenta with hemorrhage between it and the uterine wall. I will not go further into this than to state that with frequent and careful examination the occurrence of such a hemorrhage if of considerable extent should be discovered. Hence it follows that in practically every case of eclampsia there must have been evidence of the preceding toxemia. It is probably nearer the truth to say in these acute cases that our vigilance had relaxed for a short time, that we had not seen our patient, had not examined the urine, nor taken the blood pressure for a week or more, that we had taken no note of uterine pains which might have been significant, that due regard had not been shown to headaches, digestive disturbances, etc., than to say as it is so often said ''that the convulsions came on like a bolt out of the blue sky.'' With a patient in a good hospital where she is under constant observation with daily urinary examinations and blood pressure findings, very few if any such cases would be recorded. In my own cases where one or more convulsions have occurred in women in whom evidences of the toxemia had escaped my observation the results have been uniformly good. The patients who die are the ones in whom the toxemic signs and symptoms would not have escaped the observations of a competent obstetrician in touch with the patient.

My paper is intended as an appeal to those who undertake to carry a pregnant woman to a safe delivery to discover these signs of the preceding toxemia before serious damage has been done and to end the pregnancy when it is evident that this toxemia is not under control. Procrastination when danger signals persist in spite of diet, rest, eliminative treatment, etc., is as a rule unjustifiable. There is increasing evidence to show that the lesions in the kidneys, liver, heart and brain resulting from this toxemia, are, at times, permanent. It is quite logical to believe that a woman *who has nearly died of eclampsia must have changes in these organs comparable to a certain degree with*

similar lesions in another woman who actually dies of the disease. If in the *latter* one finds at autopsy the extensive degenerations depicted by pathologists, there must be somewhat similar degenerations in these vital organs in the *former.* Certainly in some patients the albuminuria, the increased blood pressure, and other symptoms persist for months after the termination of the pregnancy. Practically all authors agree that the kidneys may be permanently damaged. Little or nothing is known as to the permanent damage to the liver and careful autopsy findings as to the condition of the liver in patients who have recovered from a serious attack of eclampsia and died of some other disease would be most instructive.

The signs and symptoms of preeclamptic toxemia are usually manifested in the last half of pregnancy but may make their appearance as early as the third month of gestation. Certainly it behooves the obstetrician to keep in touch with his patient from the time he is engaged, and to see her at least every two weeks in the early months, and weekly for the last three months of pregnancy. Should any symptoms of toxemia arise, of course, it may be advisable to see her every day or oftener. She should be instructed as to the symptoms of toxemia and told to report as soon as they manifest themselves.

The early signs and symptoms of the preceding toxemia are several and should be familiar to every one who does obstetrics. The chief ones are albuminuria, increased systolic blood pressure, edema of slight degree, headaches, slight jaundice, digestive disturbances, etc. The late symptoms such as albuminuric retinitis, edema of marked degree, violent epigastric pains, excruciating headaches, coma, etc., should not form a part of the picture of a case which is under the control of the obstetrician.

The toxemia affects the fetus as well as the mother and the effort to tide the toxic mother over several weeks until the fetus has reached full term or a viable age in order to save its life is usually futile. Cragin gave the fetal mortality in 251 cases of eclampsia occurring at the Sloane Maternity Hospital as 60.15 per cent. While this is probably higher than the average, it is certainly lower than the mortality where the toxemia occurs before the sixth month of gestation. He says truly ''one of the problems facing the obstetrician in the toxemia of pregnancy is whether aside from the mother's interest, which usually should be paramount, the fetus has a better chance of life and development by remaining longer *in utero* or by being brought into the world. The risk of the fetus becoming more toxic or an accidental hemorrhage occurring at any time are so great that often the fetal chances are better from an interruption of pregnancy than from its longer continuance.'' I have seen several infants die in convulsions after being born of mothers suffering with preeclamptic toxemia. Is

it not more rational and better obstetrics in a case where there is an increasing or persisting albuminuria, increased and increasing systolic blood pressure, headaches, etc., in spite of conscientious efforts to control the toxemia, to end the pregnancy with every assurance that the woman will get entirely well, than to allow her to go into convulsions with the bad prognosis both to mother and child?

The maternal mortality in Cragin's 251 cases was 28.3 per cent. Williams estimated it at 20 to 25 per cent and the fetal mortality at about 50 per cent. Assuming that by the timely ending of the pregnancy there is no maternal mortality, then if there is a slightly increased fetal mortality (and this is doubtful) is not the saving of 28 out of every hundred mothers well worth while? I am so firmly convinced that this treatment is right, that with patients under my control I shall consider myself derelict in my duty if I ever have another death from eclampsia. It is much better for all concerned to end the pregnancy before the patient has been permanently crippled, let her get well and then have healthy babies than to run the risk of permanent invalidism, incapacity of bearing a healthy child, and a 28 per cent risk of dying. There is nothing original in this idea, but my experience and observation have so thoroughly convinced me that it is correct that I wish to emphasize it.

I shall cite briefly three illustrative cases:

CASE 1.—Mrs. R., primipara, twenty-six years old, came to Washington about the end of April, from another city with a letter to me from her physician who wrote that he had discovered albumin in the urine with increased systolic blood pressure in the sixth month of her pregnancy. She was due July 15. Examination of the patient showed a fairly heavy trace of albumin in the urine, a systolic blood pressure of 160. There was no edema, no headaches, no eye symptoms, but marked digestive disturbances. In spite of rest in bed, colonic irrigations, a diet consisting largely of milk, and catharsis, the albumin increased from ¼ to ½ per cent. No casts were ever present and the urine though slightly acid showed on boiling evidences of albumin only after the addition of acetic acid. Her blood pressure increased to 200. She and her husband were very anxious to have a living child. I finally decided that it was too risky to allow the pregnancy to proceed further, so on June 8 she was sent to Columbia Hospital to have the pregnancy terminated. The same night labor came on and she was delivered of an infant weighing 3 pounds 9 ounces. It lived a few hours only. The albuminuria decreased slowly but was in evidence 8 months after labor; it finally disappeared. The increased systolic blood pressure subsided. in about one month. She remained well, and has had since two healthy babies. She has shown no signs of toxemia since the first pregnancy.

CASE 2.—Mrs. O., a primipara, thirty-seven years old, was due to be delivered January 8, 1922. She came to me from the country in November, 1921. She had been told by her doctor that her urine was normal. On examination she proved to have a trace of albumin in the urine, her systolic blood pressure was 155, there was slight puffiness under the eyes and slight edema of the ankles. She entered Columbia Hospital, was put to bed, purged, given milk diet, but in spite of treatment she developed headaches, increasing systolic blood pressure

(197), increasing albuminuria and increasing edema. Spontaneous labor ended the pregnancy December 12 and she was delivered of a 4¾ pound child, which was placed under the care of a competent pediatrician. It did fairly well until allowed to nurse its mother at the end of 48 hours. It then developed convulsions and died in twelve hours. Under rest, purgations and diet the albumin decreased, the systolic blood pressure grew less but at the end of five weeks there was present a considerable trace of albumin and her blood pressure was 140. Her headaches persisted for several weeks. She has since given birth to a healthy child. I have not examined her since her delivery.

CASE 3.—Mrs. V. D., a primipara, twenty-six years old. She was due to be delivered June 25, 1924. Except that she had during March an attack of bronchitis followed by a persistent cough her condition was not disturbing until April 16. I had seen her one week before this visit when for the first time I discovered a very faint trace of albumin in the urine and a slight rise in her systolic blood pressure. She was put upon the usual treatment but in one week her condition was so alarming that she was sent to the Columbia Hospital for observation. Her blood pressure was 160; the urine showed a heavy trace of albumin and casts; there was nausea, diarrhea, headache, shortness of breath, etc. After 24 hours' observation her symptoms all grew worse and I induced labor. She gave birth to twins. These were premature and died within a few hours. My last examination of the patient was May 23 when the blood pressure was normal but the urine still contained a faint trace of albumin.

The first two cases show, I think, the usual type of preeclamptic toxemia. In both the toxemia manifested itself two to four months before labor was due. In one it had been discovered because the patient had been under the care of a competent obstetrician. In the other a careless observer had failed to discover the warning signs. In both, Nature ended the pregnancy before the development of convulsions. In both the albuminuria persisted several months after labor. One may be permanently crippled. In both in spite of painstaking efforts to save them the babies died. How much better it would have been to have ended the pregnancies before the toxemia had persisted for so long a time, and to have started the women on their child-bearing careers in a healthy condition. In the third case the development of the toxemia was so rapid that had I not seen the patient each week she could have had convulsions without my being aware that she was not well. This case illustrates most forcibly the necessity of frequent examinations in the latter months of pregnancy. The teaching that seeing the patient once in two weeks is sufficient will have to be radically changed.

To sum up briefly I believe:

1. That there are very few if any deaths from eclampsia without preceding signs and symptoms, which could have been discovered by constant and careful watching.

2. That it is imperative that the doctor who assumes the responsibility of an obstetrical case should see and examine his patient not

less than once in two weeks in the early part, and weekly in the last two or three months, of pregnancy.

3. That it must be true that women with eclampsia who barely recover have lesions in the liver, kidneys, and perhaps the heart and brain which are permanent. These may or may not seriously affect the health of the patient subsequently.

4. That in cases of preeclamptic toxemia indicated by albuminuria, high systolic blood pressure, slight edema, headaches, and digestive disturbances, it is our duty to endeavor by rest in bed, milk, or markedly restricted diet, colonic irrigations, purgation, etc., to control the toxemia; and in case of failure to do this to promptly end the pregnancy. That to wait for albuminuric retinitis, marked edema, partial suppression of urine, is rashly jeopardizing the chances of living in the mother without correspondingly improving the prognosis for the child.

5. That it shall be my endeavor in the future to allow no patient under my control to come to that stage of toxemia which is now termed eclampsia.

1730 K. STREET, N. W.

INTERSTITIAL PREGNANCY, WITH THE REPORT OF AN UNRUPTURED CASE*

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"INTERSTITIAL pregnancy refers to the class of cases in which the ovum develops in that portion of the tube which passes through the wall of the uterus, or in a diverticulum from that part of the tube." This definition, as given by Henrotin, taken in conjunction with this addition by Farrar, viz.: "Or in an accessory tube." is, perhaps, the best anatomic description of the condition.

Frequency.—The most interesting feature of interstitial pregnancy is its relative infrequency, for next to ovarian, it is the rarest form of ectopic gestation. The series most often mentioned for statistical purposes is that of Rosenthal, who found that in 1324 ectopic pregnancies, the interstitial type occurred in 3 per cent. Munro-Kerr reports one case in a series of 80 ectopics, or 1.25 per cent. Wynne, from the Johns Hopkins clinic, reports only two that could be claimed as interstitial, out of a total of 304 ectopic pregnancies, or 0.65 per cent. In a total of 1547 collected cases of ectopic pregnancy, there are 18 cases of interstitial pregnancy, or 1.16 per cent. At Touro Infirmary, in a series of 45 cases of ectopic pregnancy operated on during the period from 1921-1923 inclusive, there are recorded two cases of the interstitial type, or 4.4 per cent.

Etiology.—Nearly all writers are agreed that previous inflammation is the predisposing cause of tubal pregnancy as well as of interstitial pregnancy. Mall, in a report based on 117 specimens of tubal pregnancy, collected over a period of seventeen years, laid great stress upon the inflammatory changes which must have preceded the lodgement of the ovum in the tube. Nevertheless, Farrar, in her résumé of the subject, does not believe that inflammatory changes play such an important part in causing interstitial pregnancies as in causing the true tubal type. She gives as additional causes mechanical obstructions, such as the uterine orifice of the tube being obstructed by a mucous polyp; a fibroma or a myoma in the wall of the tube itself; or an adenoma at the angle of the tube or at the junction of the tube and the uterine cavity. In addition she mentions congenital malformation, such as accessory tubes or diverticulae. I would also suggest, from the findings in my own case, that possibly infantilism of

the female genitalia, with a very small lumen of the tube, can cause
an arrest of the growing fertilized ovum in the interstitial portion.
It was also brought out by Michinard that in most cases of tubal
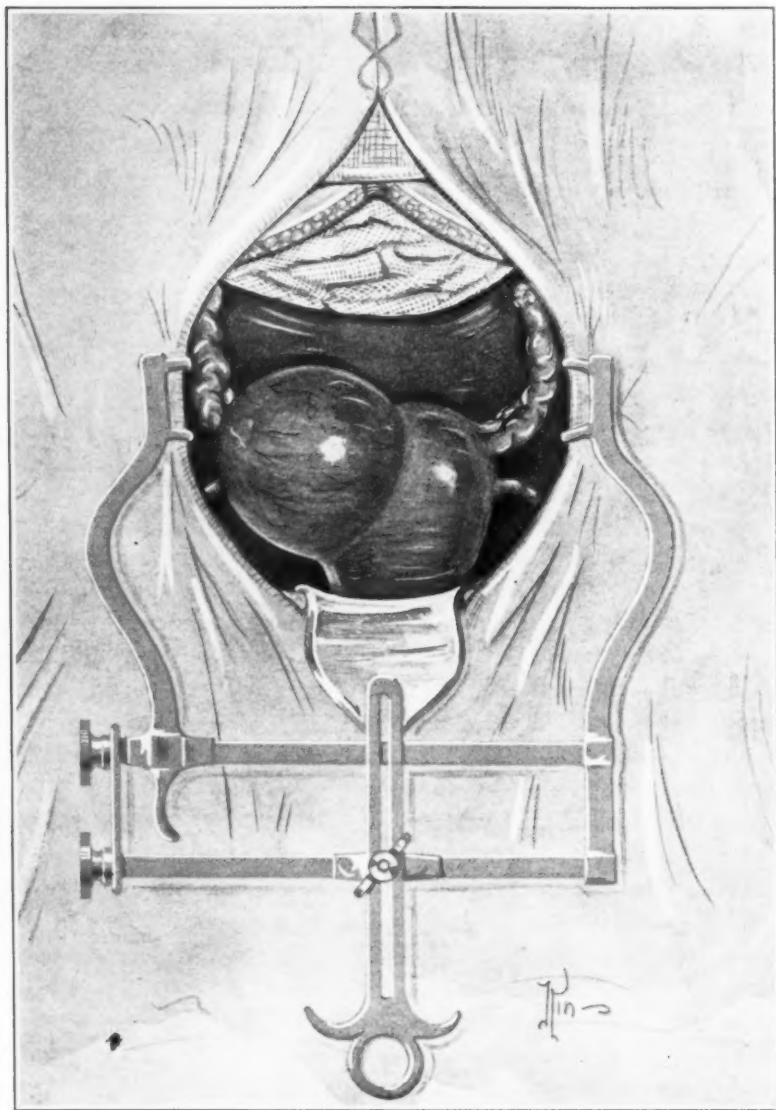
Fig. 1.—Semidiagrammatic, showing relationship of cornual pregnancy to the body
of the uterus.

gestation the ovum is arrested some distance from the fimbriated end
of the tube, and that as it requires some seven days for the impreg-
nated ovum to travel through the oviduct, the ovum may overdevelop
and wedge in a narrowed part of the tube.

Course.—That an interstitial pregnancy, as such, may go to term is
greatly doubted by most authorities. It is perfectly reasonable, how-
ever, to suppose that, should an abortion into the uterine cavity, or
a rupture and an abortion into the broad ligament or abdominal cav-
ity, occur, that the pregnancy could go on to term as a uterine or
abdominal pregnancy, as the case may be. However, cases of such a
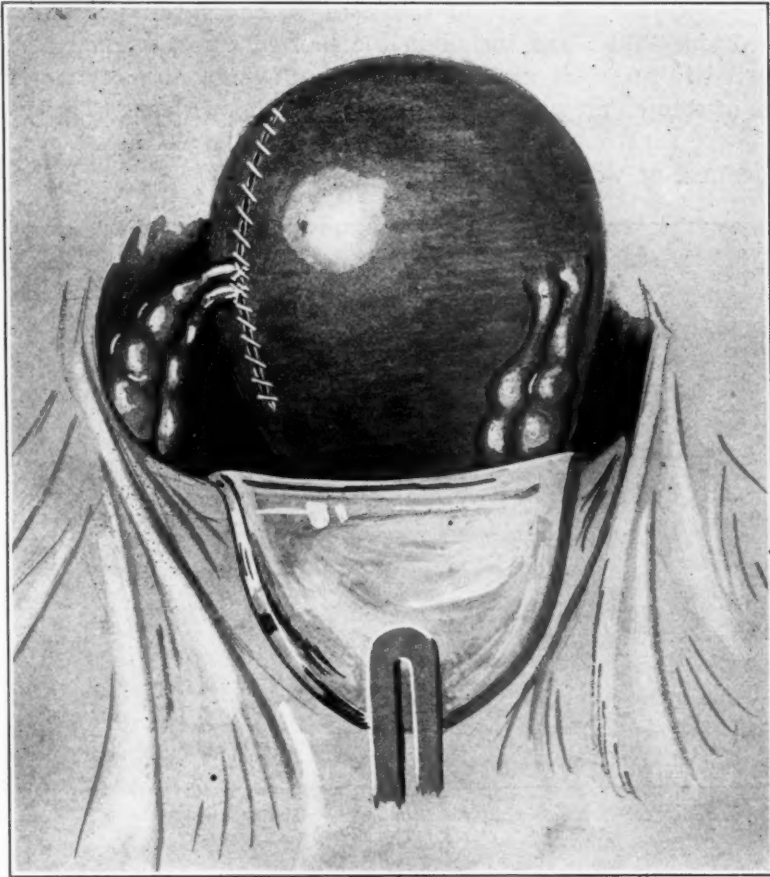
Fig. 2.—Semidiagrammatic, fixation of tube and round ligament to lateral wall of
uterus, after resection of cornu.

nature, reported in the literature, are rather dubious and are not
above criticism.

Diagnosis.—The diagnosis of interstitial pregnancy is very rarely
made before rupture. Nevertheless, one is justified in suspecting this
condition when the signs and symptoms of early pregnancy are sup-
plemented by the usual symptoms of ectopic pregnancy. The pain is
early and, as Schumann states, usually develops before bleeding or
death of the ovum takes place, due to the fact that the uterine horn

does not easily stand distention. On vaginal examination, one finds a fairly regular enlargement of one cornu, sessile and merging with the outline of the uterus.

I wish to stress one point in regard to ectopic pregnancies in general, namely, that vaginal bleeding is no contraindication to a vaginal examination, and that one is never justified in making a diagnosis of a threatened abortion until the possibility of an extrauterine pregnancy is eliminated. Of the 26 cases of interstitial pregnancy reported since 1918, and including the present cases, vaginal bleeding occurred in seven, or 26.9 per cent. Graffagnino in a review of 186 cases of ectopic pregnancy admitted to the New Orleans Charity Hospital over a period of fourteen years, states that 60, or 32 per cent, complained of vaginal bleeding.

Fig. 3.—The resected tumor split longitudinally, showing the fetus *in situ* and the sac protruding.

Prognosis.—The prognosis in the interstitial type of ectopic gestation not operated upon before rupture is grave. When one considers the anatomy of this section of the uterus, one can readily see why it is easily possible for such a fearful hemorrhage to occur, as free bleeding comes from both the ovarian and uterine arteries. Wynne gives the mortality as 11.9 per cent, and cites four deaths in a series of 31 cases; Finsterer, two deaths in a series of 17 cases; Schink, four deaths in a series of 19 cases.

Treatment.—The treatment of interstitial pregnancy, whether ruptured or not, is always surgical. If diagnosed before rupture, immediate operation should be advised by the abdominal route. If the

pregnancy has not advanced too far, a resection of the affected cornu is the operation of choice.

When rupture has occurred, immediate laparotomy must be done, as the patient nearly always is *in extremis* due to the severe hemorrhage. In extreme cases, hysterectomy is the operation of choice and can be done with a greater degree of rapidity. In the less severe cases excision of the uterine cornu can be done. The postoperative treatment consists chiefly in combating shock, and where possible the giving of a transfusion.

CASES OF INTERSTITIAL PREGNANCY REPORTED SINCE 1918

Cope, V. Z. (*Proceedings Royal Society of Medicine*, 1920, Sec. *Obst. and Gynec.*, 13: pt. 3: 156-58.)
  Age, forty years. History shows three previous miscarriages at 3½ months. Operation 36 hours after onset of acute pain. Left side. Supravaginal hysterectomy. Recovery.

Curtis, A. H. (*Surg. Gynec. and Obst.*, May 1918: 551-53.)
  Age, twenty-seven years. Para ii; one miscarriage. Unruptured. Period of gestation not stated. Resection of right half of uterus and right tube. Recovery. No microscopic study.

Daniel, C. (*Surg. Gynec. and Obst.*, Jan. 1922; 15-21.)
  Age, twenty-six years. Four normal pregnancies and three miscarriages. Gestation of about 2 months. Left side, unruptured. Supravaginal hysterectomy with ablation of adnexa under lumbar and spinal anesthesia. Recovery.
  Age, forty-two years. Four full-term pregnancies, fifth pregnancy terminated in induced abortion at fifth month, followed by pelvic abscess. Sixth pregnancy at full term. History of gonorrheal infection. Ruptured. Abdominal hysterectomy leaving in both ovaries. Present pregnancy of about two months' duration, onset of pain, violent. Recovery.

DiPalma, S. (*Surg. Gynec. and Obst.*, Sept. 1921: 285-87.)
  Age, twenty-nine years, para ii. Right fallopian tube removed for chronic salpingitis. Six months previous to admission curetted for three months' incomplete abortion. Ruptured five hours before admission. Left horn with tube removed. Recovery.
  Age, thirty-two years, para vii. Several difficult labors, last pregnancy terminated in abortion at six weeks. Ruptured. Left salpingectomy, after diagnosis of tubointerstitial pregnancy. Death from sepsis.

Eckhard, Ph. (*Deutsch. med. Wchnschr.*, 1921: 996.)
  Age, thirty-one years. Married two years, no pregnancies. About three months pregnant. Unruptured. Resection of right cornu. Recovery.

Falls, F. H. (Surgical Clinics of Chicago, June, 1920: 655.)
  Age, twenty-eight years. Ruptured. First diagnosis, incomplete septic abortion. Subtotal hysterectomy. Recovery.

Gilbert, T. C. (*Texas State Jour. Med.*, 18: 546-47. 1923.)
  Age, twenty-six years, one pregnancy. Ruptured into abdominal and uterine cavity and aborted a fetus of four months. Supravaginal hysterectomy. Death.

Heekes, J. W. (*Brit. Med Jour.*, 1922, 2: 309.)
  Age, twenty-nine years. Two and one-half months pregnant. Left side involved. Rupture in incipiency. Supravaginal hysterectomy. Recovery.

Kennard, K. S., and others (AM. JOUR. OBST. AND GYN., 2: 642-44. 1921.)
  Age, thirty-eight years. No pregnancy during first seven years of marriage.
  One pregnancy two years after operation for retroflexion. Diagnosis of rup-
  tured uterus. Fetus of three months size found in peritoneal opening. Suture
  of uterus. Tube drain left in. Death. Complete autopsy report showing
  condition to have been left cornual pregnancy.
MacIntyre, Donald, (Journ. of Obst. and Gyn. of the Brit. Emp., 29: 314-19. 1922.)
  Age, twenty-three years. Followed salpingoophorectomy of same side (right).
  One normal child 18 months after operation mentioned above. Present preg-
  nancy ruptured. Resection of right cornu.
Martius, (Arch. f. Gyn., 120: 320-22. 1923.)
  Age, thirty-one years. Para vi. Unruptured, seven months pregnancy of four
  years' duration with normal pregnancy in the meantime. Left side. Supra-
  vaginal hysterectomy. Recovery.
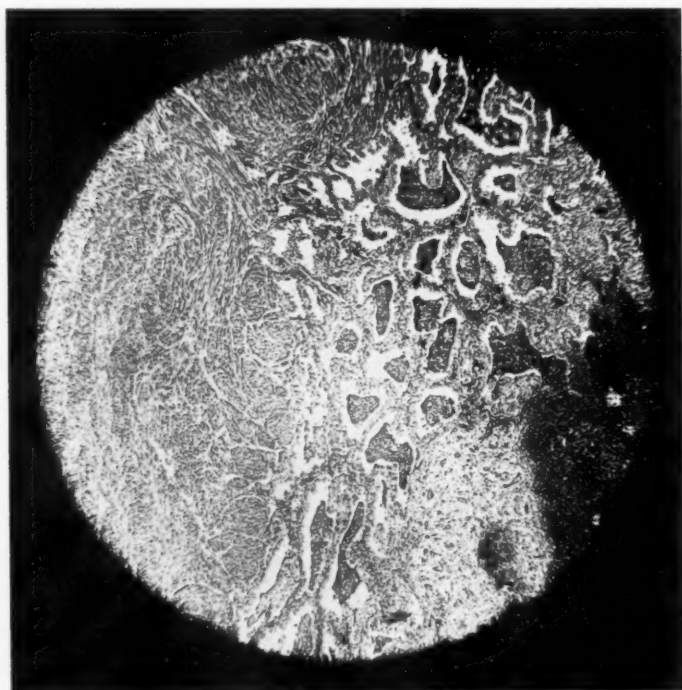
Fig. 4.—Microphotograph (X90) showing uterine musculature, uterine glands and
decidua.

Moore, G. A. (Boston Med. and Surg. Jour., 187: 284-88. 1922.)
  Age, twenty-seven years. One child. Present pregnancy involves left side. Opera-
  tion before rupture; excision of tumor including left tube. Recovery.
Pfaff, O. G. (Am. Jour. of Obst., 79: 106-08. 1919.)
  Age, not stated. Ruptured at eight weeks, two weeks previous to operation.
  Suture of uterine wall. Rubber tube drain through culdesac into vagina.
  Recovery.
Rose, B. T. (Lancet, 1919, 1: 175.)
  Age, thirty years. Incomplete abortion 18 months previous. Ruptured. Preg-
  nancy of right cornu. Resection of right part of uterus with right tube and
  ovary.

Turenne, A. (*Revista med. del Uruguay*, 23: 290. 1920.)

Age, forty-one years. Para iii, deliveries normal, children all abnormal. Present pregnancy at 3½ months unruptured. Left side involved. Doubtful case. Excision of mass.

Age, twenty years. Para iii; about three months pregnant. Right cornu. Operation not stated; pregnancy progressing normally four months after operation.

Age, not stated. Para iii. Four months pregnant. Left cornu. Pregnancy proceeded to term. Doubtful case.

(Cases of Turenne not described in detail.)

Vaudescal, Robert. *Contribution a l'etude de la grossesse interstitielle.* 1919.

Age, thirty-five years. Pregnancy of four months. No other pregnancies, no miscarriages. Tumor on left side. Rupture during operation. Hysterectomy. Recovery.

Age, thirty years. Pregnant about one month. Sudden cessation of last menses and further hemorrhage after a few days but without pain. Condition involves right side. Abdominal hysterectomy, subtotal. Tumor unruptured.

Age, twenty-three years. One normal pregnancy, followed by slight leucorrhea until present time. Pregnancy about one month's duration. Hemorrhage of about one month. Left side involved. Resection of uterus. Recovery. Tumor ruptured.

Willette, (*Ann. de Gyn. et Obst.*, 13: 656-57. 1919.)

No age stated. Case ruptured. Suture of uterus. Recovery.

Woolf, A. E. (*Lancet*, 1922, 1: 11-12.)

No age stated. One child, no miscarriages. No pregnancies for past seven years. Tumor, bilateral, ruptured. Subtotal hysterectomy.

Wormser, E. (*Schweiz. med. Wchnschr.* 51: 343. 1921.)

Age, thirty-eight years. Para iii, last in 1913. Ovarian cyst removed from left side in 1917. Present pregnancy of three and one-half months' duration. Ruptured. Supravaginal hysterectomy.

REPORT OF PERSONAL CASE

Case No. B. 2259 (Touro Infirmary). Mrs. F. P. G., white; age twenty-seven years; married about five months. Complaint: Pain in the abdomen; vaginal bleeding. Present illness began April 16, 1924, as a pain in the lower part of the abdomen, more intense on the right side. Pain was cramplike in character and was described as "bearing-down pain." She had missed her period which was due on Feb. 9, 1924. Ten days later she menstruated for one day only, and with some pain. Every three or four days following this she would lose for a day at a time. After the onset of the severe pains mentioned above, she began to lose every day. Was nauseated and vomited several days before the onset of the pain. Pain not severe enough to cause the patient to faint.

Appendectomy in December, 1921.

Physical examination: Fairly well developed and fairly well nourished, white female. Short of stature, weight, 93 pounds. Skin, warm, dry and elastic. Tenderness present over the lower part of the abdomen, particularly on the right side.

Menstrual history: Began at the age of twelve years. Regular, every 28 days, lasting 3 to 4 days. Considerable pain for first day. Passed clots as a rule.

Vaginal examination: Marital vagina. Mucous membrane of purple color. No evidence of infection of Bartholin's or Skene's glands. Slight amount of blood in vagina. Cervix soft, not dilated. Uterus soft, not markedly enlarged. Continuous with fundus of the uterus on the right side is an ovoid mass about the size of a small orange. Sessile, not pedunculated. Tubes and ovaries negative.

Diagnosis: Unruptured interstitial pregnancy (right side).

Operation: April 21, 1924. Ethylene, preceded by morphia gr. 1/6; atropine gr. 1/150. Skin was prepared with benzine-iodine and iodine. Abdomen entered through a midline incision between umbilicus and symphysis pubis. Usual protection of skin edges and walling off of general cavity. The uterus was smaller than the time of pregnancy calculated from the menstrual history would indicate. The right cornu of the uterus was ballooned out to about the size of a small orange. (Fig. 1.) The mass was of a purple color. The round ligament was inferior to and in front of the mass. The tube and ovary on this side were normal. The mass was resected without rupture. (Figs. 2, 3, and 4.) The wound in the uterus was closed with a double line of No. 2 chromic sutures. The right tube and ovary were left in. The appendix had been removed at a previous operation. Abdomen closed in tiers:—No. 2 chromic for peritoneum and fascia; silk-worm and Michel clips for the skin. Discharged from hospital on May 2. On May 15, 1924, patient was feeling well; able to be up and about. No abdominal tenderness. Uterus in good position, freely moveable; no pain or tenderness in right fornix.

Pathologic Report by Dr. John A. Lanford. Gross: The specimen is an irregularly oval mass measuring 6½ cm. in length, 5½ cm. at its widest portion and 4½ cm. in thickness. Its outer surface is for the most part a bright reddish pink color, one half of which is covered with serous membrane, being smooth and free from adhesions. The other half presents a freshly cut surface which is contracted around an opening through which projects a fluctuating mass, bright red in color. On the inferior border at the junction of the freshly cut surface with the smooth serous membrane, is the remnant of the fallopian tube. On sectioning the mass, it is found to be a portion of the uterus in which is located a fetus and placenta within its membranes. The fetus measures 3½ cm. in length. The cavity of the cornual portion of the uterus is filled up with placental tissue. The mucosa is thickened, deeply congested, but intact. The walls of the cornual portion of the uterus are increased in thickness and hypertrophied, but show no increased amount of blood.

Microscopic: The microscopic study of the sections from the uterine wall show hypertrophy of the muscularis together with edema and congestion of the blood vessels. The mucosa is thickened, presenting the hypertrophy associated with pregnancy and its upper surface is converted into decidua. The attached portion of the placenta presents a normal picture. The sections through the attached portion of the fallopian tube show hypertrophy of the wall, flattening out of the mucous processes and increased congestion. No decidual cell formation is found.

Choice of Operation in Cases Reported 1918-24

Resection	5	Suture	3
Hysterectomy, complete or supravaginal	11	Resection with adnexa	4

Table includes only 23 of total of 26 cases, from lack of information on remaining three.

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A METHOD FOR THE ASPIRATION OF MUCUS IN ASPHYXIA NEONATORUM

By Louis A. Bunim, M.D., Washington, D.C.

(From the Obstetrical Service, Columbia Hospital for Women)

IN the removal of mucus from the infant's trachea the desirable thing is to clear the trachea without aspirating the very tenacious material into one's mouth.

Very often we find great difficulty in avoiding this unpleasant experience, when an ordinary catheter is employed.

I have devised this new aspirator which, so far as I know, has not been previously described.
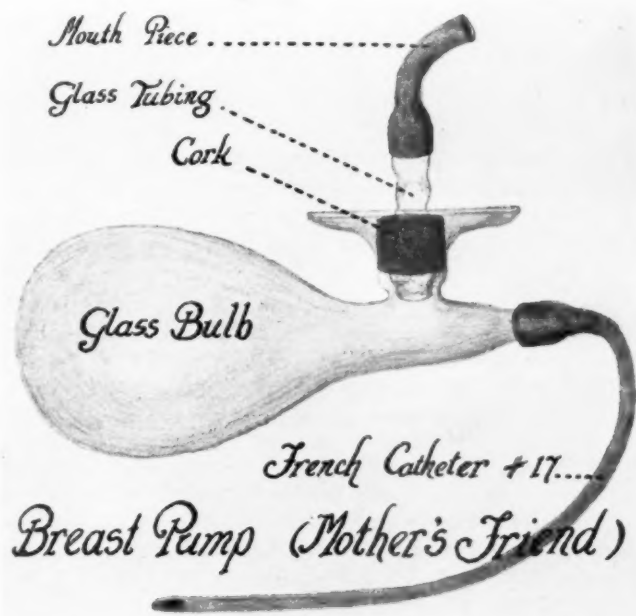
Fig. 1.

It can be readily constructed from a breast pump on the market under the name "Mother's Friend."

The catheter is that of an ordinary No. 17 French. The tip is placed at the level of the epiglottis and suction made at the mouthpiece, the force of which should not exceed that used in smoking a pipe, will cause the mucus to accumulate in the bulb, and produce the desired effect.

REPORT OF A CASE OF TABES DORSALIS COMPLICATING
PREGNANCY

By Robert N. Hamblen, M.D., Spokane, Wash.

Mrs. J. E., aged forty-one, primipara, was referred to me in the sixth month of her pregnancy.

Family History.—Mother died of aneurysm of the aorta at sixty-eight years. Patient's former husband was in poor health and had pleurisy at one time, but no history of lues. Present husband is in good health. Father, two brothers and two sisters are living and well.

Personal History.—Patient had measles and whooping cough and several attacks of grip, and was supposed to have had tuberculosis of the ankle twenty years ago. Tonsillectomy six years ago. Puberty at eleven years. Menses every twenty-one days, for three days, and formerly painful. Was married the first time fifteen years ago but was never pregnant by her first husband. Second marriage three years ago, followed by one abortion at two and one-half months which was supposed to have been caused by an automobile trip. This abortion was followed by a curettement.

Present Condition.—First day of last menstruation was March 31, 1923. Quickening occurred August 15, slight nausea and vomiting during the first three months of pregnancy. During July and August patient had three attacks of sudden severe abdominal pain radiating around the chest to the back, but not to the shoulder or scapula and not followed by jaundice. In some of these attacks the pain lasted as long as four hours and was accompanied by sweating and vomiting.

The findings on examination by Drs. F. Epplen and G. E. Price on August 22 were briefly as follow:—

Eyes: pupils unequal, right larger, irregular in outline and sluggish in reaction to light, left pupil normal. Gait normal. Romberg sign present but not marked. Knee jerks absent. Positive Gordon, Oppenheim and Chaddock signs, latter on left side only. Normal plantar reflex on both sides. Abdominal reflex present on left side, absent on right. Heart and lungs normal. Abdomen corresponds in size to about six months' pregnancy. Urine normal. Blood cell count and Hb. within normal. Blood Wassermann test negative. Spinal fluid shows twelve cells per cmm. and Wassermann test 3+. Diagnosis was made of tabes dorsalis, the attacks of abdominal pain being considered gastric crises, and accordingly antiluetic treatment was instituted. Seven intravenous injections of 0.6 gr. salvarsan were given intravenously between August 24 and October 8, with only one attack of abdominal pain occurring during this time.

Pregnancy was uneventful from this point on, labor occurring January 21. The total length of labor was about forty-eight hours; during the first stage the pains were irregular and ineffective. The position was L. O. P., converted into R. O. A. by Pomeroy's method of suprapelvic rotation when the cervix was sufficiently dilated to permit passage of the operator's hand. Labor was then permitted to continue for about six hours when low mid-plane forceps were applied and delivery easily accomplished. The baby weighed 8 pounds 11½ oz., cried spontaneously and appeared normal in every way, showing no clinical evidence of syphilis. Labor not considered more difficult or prolonged than would be expected in a forty-one year old primipara with a posterior position. The patient had two attacks of abdominal pain during her puerperium, which were considered gastric crises, but

otherwise her two weeks stay in the hospital was uneventful. She was last seen May 7, and reported that she was having attacks of abdominal pain about once a month, but would not follow advice and resume treatment.

This case was of special interest from an obstetrical point of view because of the rarity of such cases and the uncertainty of the effect that a tabetic lesion would have upon the onset and progress of labor and contraction of the uterus postpartum. I have been unable to find any report in the literature of a case similar to the above, although Dr. Frederick L. Good has recently reported a case* of pregnancy and labor complicated by a gunshot injury of the spinal cord.

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OBSERVATIONS ON TRAUMA TO THE UNDILATED BUT DILATABLE CERVIX†

By PAUL T. HARPER, M.D., ALBANY, N. Y.

THAT cervical and lower segment lacerations result commonly from conduct of the high-forceps operation, while injuries of the kind are both less common and less extensive following performance of internal podalic version and breech extraction, are well-known facts that are doubtless in great measure responsible for the tendency among obstetricians to employ version and extraction in preference to the high-forceps operation when artificial advance is necessary.

But the observation it is desired to record is as follows: immediately after version and extraction the cervix is commonly so short, so high and so thin that it can neither be inspected in position nor brought downward and forward by application of the relatively broad and non-cutting cervix forceps. Determination of extent and, on occasion, even of the existence of possible injury to uterine tissue is therefore most unsatisfactory, and digital palpation of the cervical rim not infrequently has to be depended upon for purposes of recording possible injury, it being left for the routine bimanual examination at end of the second week to determine actual damage done.

Condition of the cervix just described is in striking contrast to that presented by the result of practically all high-forceps operations, and after many of the "medium" variety, where either the anterior lip appears at the vulva or where the entire cervix can readily be brought into view by gentle traction upon it.

High position of the postpartum cervix in the first group of cases is in itself evidence of physiologic dilatation, in the course of which the lower segment is thinned out, and as dilatation of the external

os advances toward completion, is drawn progressively upward over the presenting part. A physiologically dilated cervix may be expected to suffer no more than abrasion or superficial laceration, and extraction by the breech through a properly prepared uterine orifice can be shown to facilitate the type of dilatation and upward advance of the lower segment that leaves the cervix more or less uninjured.

On the other hand, the fact that the cervix following termination of a high-forceps operation is commonly low is evidence that upward advance of the lower segment did not occur; and the common association of variable laceration is readily explained on the basis of advance of a more or less resistant body through the incompletely dilated external os. Dilatation in cases of this kind is far from physiologic. With each expulsive effort the presenting part advances against the enveloping cervix and lower segment, the latter structures are fixed by pelvic counterpressure, and complete physiologic dilatation is improbable. The latter process is actually obstructed after passive congestion and edema have added to the thickness of the lower uterine musculature. In these cases manual dilatation is inffectual. Even with the presenting part immobilized by forceps, the rim of the fully dilatable cervix can be displaced upward but there is no force at work to draw the lower segment upward, and both structures advance as soon as tractile force is applied.

A cervix that is incompletely dilated and incompletely dilatable (considering upward advance of the lower segment a necessary feature of dilatation) may be expected to suffer injury when artificial advance through it is produced. Cervical injury, therefore, is to be presumed where high arrest of the head and incomplete dilatation are associated and where instrumental advance is brought about.

Two other features of forceps application are: cutting of the cervix by edges of the forceps blades and downward pull on the broad ligaments. They emphasize the undesirability of an operative procedure that subjects lateral supports of the uterus to that downward pull, which the low postpartum position of the cervix gives evidence of their having been subjected to, and that not infrequently traumatizes the cervix even before the large, rounded presenting part is drawn well into it.

Explanation of the fact that the cervix so often escapes discoverable injury in breech extraction following version, appears to be offered by comparing conditions referable to cervix and passenger that obtain during extraction with those presented during physiologic dilatation in vertex presentation.

In the latter, membranes characteristically remain intact until complete dilatation has occurred, or until the external os and lower segment are thin. At this time each has advanced well upward over the head. Pull of the longitudinal uterine muscle fibers is the active force in producing the advance referred to, but quite as important as

a contributing factor is the shape of the fetal ovoid. Its smooth and generally symmetrical surface, made so by integrity of the bag of waters, offers every advantage to upward advance of cervix and lower segment, and dilatation proceeds uneventfully. Importance of intact membranes in physiologic dilatation may be judged from the complete failure in progressive dilatation met not infrequently when membranes rupture early and the uterine musculature applies itself more or less intimately to the irregularities of the fetal outline in the pathologic state known as "retraction."

While it is true that in breech extraction there is no smooth, fetal ovoid up on to which and over which cervix and lower segment can be drawn, it is the generally parallel sides of the passenger that meet the resistance of the uterine musculature, which is readily drawn upward along the roughly cylindrical body of the child, as the latter is made to advance. Deep anesthesia under which version is done not only makes complete dilatation possible but it also can be counted upon (if actually deep) to insure against the setting-up of retraction, that escape of liquor amnii, and intrauterine manipulation incident to version may be expected to invite.

Skillfully performed version and extraction unquestionably occasion less cervical trauma than does the high-forceps operation in equally competent hands; and the experience of impartial obstetricians bears out the contention. Because the aftercoming head is never called upon to advance through an incarcerated and edematous cervix in breech extraction, while in every high-forceps operation and in many of the high-medium varieties disproportion between pelvis and passenger is increased by thickness of the enveloping lower segment, it may be argued that version and extraction are less dangerous to the child.

Conservatism, therefore, dictates choice of the method of delivery referred to in high arrest of the head; and wisdom dictates that choice be made when delivery is determined upon, while mother and child are good risks, rather than at a time when each has been subjected to the dangers of repeated and ineffectual attempts at delivery by forceps and is, therefore, a less satisfactory risk. It is apparent that it is only as each method of delivery is made elective that its relative merits may be judged.

In what has preceded, attempt has been made to establish a reasonable basis for the contention that version and extraction have a definite place in progressive obstetrics as truly elective procedures: it is believed their utility is actually broader than conservative practice subscribed to no more than a decade ago. It is presented as a contribution toward solution of the important obstetric problem of the day, namely the actual "place of version in obstetrics."

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Society Transactions

AMERICAN GYNECOLOGICAL SOCIETY

FORTY-NINTH ANNUAL MEETING

HOT SPRINGS, VA., MAY 15, 16, and 17, 1924

(Concluded from December)

DR. M. PIERCE RUCKER, Richmond, Va., (by invitation) read a paper entitled **The Use of Novocaine in Obstetrics.** (For original article see page 35.)

DISCUSSION

DR. ERNEST WILLIAMS, LONDON, ONTARIO.—Dr. Rucker says that the anatomy of the nervous system of the uterus is pretty well known, but that the physiology is still in doubt, and it seems to me that that is the real thing we wish to know. Gaskell in his work, says that the uterus is supplied by the fibres from the lumbar and gets no fibres from the sacral plexus, but Dr. Rucker's work seems to show that this is not so.

We speak of contraction of the uterus in labor pains and we believe the contracting fibres are causing the pain. I do not know whether it is there or in the dilating lower segment. The question of pain in the uterus has, of course, not been worked out. Some recent work done by F. Miller and Simpson has shown that pain in the stomach originates only in the mucous membrane and travels by way of the sympathetics; and if true, this might be the same in the uterus, the pain is only in the endometrium. It is possible that when the uterus is dilated and the endometrium spread out, that it does not give painful sensations, but later when it is contracted there may possibly be pain originating there.

DR. C. H. DAVIS, MILWAUKEE, WIS.—Dr. Rucker's treatment and conclusions are of interest, but two things of a practical nature occur to me. Do we not need a tonic condition of the pelvic floor for the mechanism of natural labor, especially in rotating the head anteriorly? If we paralyze the pelvic floor, may we not see delay and difficulty in parturition? I understand him to say that this method of treatment is especially applicable for operative cases. I do not see just how that can be, and I welcome further information upon that point. Personally, I have not seen sufficient reason in the reports on sacral anesthesia to adopt it.

DR. COLLIN FOULKROD, PHILADELPHIA, PA.—Has there been any study made of return of sensation in these nerves, and whether it has any influence upon the nerves extending further down?

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—We have been using an anesthesia we have called "caudal" anesthesia, which I presume is the same as that of Dr. Rucker. We use about 75 c.c. of the one and one-half per cent novocaine solution injected into the hiatus sacralis. This works satisfactorily in most cases for operation on the pelvic floor and vagina, and in a good many cases of intraperitoneal surgery. I think it is of more or less limited usefulness, but I have used it in incurable cases of tuberculosis where the patient was pregnant and

where it seemed necessary not only to terminate the pregnancy, but also, in the opinion of the consultant, it appeared desirable to sterilize the woman. It seemed an anesthesia particularly well adapted to this type of case, and the operation has been done without any particular discomfort to the patient and with satisfactory results from a technical point of view.

DR. RUCKER, (closing).—I think the physiologic aspect is a very interesting one. The sensory distribution of the nerves to the uterus is shown very plainly to my mind. The dilatation of the os is entirely painless, but after you get up into the fundus, the patient complains of some pain.

In regard to the technic, it is that usually described in the textbooks: that is, you inject a given quantity, about 35 c.c.; I first used 20 c.c., but after the articles by Meeker and Bonar came out, I used more. The patient is put in a left lateral position and the sacral hiatus is very easily palpated, except in very fat individuals. Injection is made into the sacral canal. It is very important to emphasize that it is entirely extradural, and of course, not into a blood vessel. The practical management of the obstetric case and the careful selection of the anesthetic you are going to use in any given case, demands knowledge of what that anesthesia does, and I think in certain cases where you are going to have plenty of time and when extreme relaxation of the perineum is needed, sacral anesthesia does have a special place.

In regard to afterpains, I have seen no great difference in patients delivered under sacral anesthesia and those delivered with ether. The effect of the anesthesia wears off in about two hours. It is hard to conceive how you would have any effect upon afterpains unless it would be on account of the increased tone of the fundus, lessening possibly intrauterine bleeding and formation of blood clots. You might have fewer afterpains for that reason, although I have not noticed any difference in these cases.

DR. EDMUND B. PIPER, Philadelphia, Pa., presented a paper entitled **Blood-Stream Infection Treated with Mercurochrome Intravenously.** (For original article see page 17.)

DISCUSSION

DR. C. JEFF MILLER, NEW ORLEANS, LA.—I am naturally skeptical until a more general use of the method has been reported, for I am one of those who have passed through the various periods of intravenous medication suggested in the last twenty years, formalin, bichloride, nitrate of silver, and so forth; all of them merely produced a leucocytosis and practically all of them were eventually abandoned. Later came the era of the various silver salts and then Crede's ointment, which in turn were discarded. My personal experience with all of them has been highly unsatisfactory.

In a recent conversation with Dr. Young of Baltimore I received the impression that he was enthusiastic about mercurochrome, but that his best results had been obtained in cases of colon bacilli, and that he had found gentian violet more effective in the gram positive cocci.

Dr. Piper has taken the only method of giving us positive proof of the merits and demerits of this remedy, and we appreciate his scientific researches and valuable data. I am impressed also by the conservative position he has taken in his statement of results.

DR. CAREY CULBERTSON, CHICAGO, ILL.—As I understand it, Dr. Piper secures his blood culture first which, of course, is the proper basis for the intravenous treatment in the blood-stream infection. The outstanding feature of

his report lies in his statement that, after the injections the microorganisms disappear from the blood. This in itself, constitutes a definite advance. I would like to ask whether the method has been used universally in all the blood-stream infections, or in the more severe ones only.

DR. JOSEPH BRETTAUER, New York City.—I have employed mercurochrome injections from time to time, but unfortunately up to date, I find mercurochrome just one more of the many remedies and methods for the treatment of blood-stream infections, not a single one of which has actually proved efficacious. I have at present in my ward a case of severe infection following artificial abortion, with a hemolytic streptococcus in the blood. She was given an intravenous injection of 30 c.c. mercurochrome, after which a violent reaction took place, with no conspicuous change in the general condition. After 48 hours there was a remarkable improvement. She was given a second dose of 20 c.c; no reaction followed and her condition was not changed. Symptoms of multiple arthritis were the main complaints in this case. The patient developed a left panophthalmitis and died.

DR. JOHN G. CLARK, Philadelphia, Pa.—In Dr. Piper's list of cases is one which was transferred from my ward to his service, rather strikingly illustrating the direct value of his treatment. A septic infection had occurred, as I recall, during a miscarriage. When referred to my service, the patient was markedly septic. There was a hard, indurated, nonfluctuating cellulitis extending out in the base of the broad ligaments to the pelvic wall. Under rest, hot douches, and other plans, there was no abatement in symptoms, the steeple-like, elevated temperature persisting—not an extraordinarily ill woman but one who would not get well. Under the injection of mercurochrome, the patient immediately began to recover and was soon well. In this case, the immediate relief of fever and the rather prompt recovery left no doubt in my mind as to the efficacy of this treatment in this case.

Upon the point of chemical antiseptics for the blood, it may be of interest to allude to the remarkable investigations of Sir Almondroth Wright. In presenting this subject before the International Congress of Surgery in London last summer, he expressed the deepest skepticism as to the efficacy of such disinfectants. His claim is that almost any simple antiseptic agent will promptly inhibit the growth of most resistant and vigorous bacteria upon any artificial media, but when introduced into a volume of circulating blood containing active organisms, the chemical has so much greater affinity for other constituents of the blood that none is left to destroy the bacteria, hence it is not only of no value but may actually be harmful. He now is striving to perfect a means of treatment which has a very logical foundation, and one may look with great interest to further announcements from his laboratory. He holds that the use of the various combative area may be of great value if properly adjusted to the patient's physiology, but as usually employed possess many evil possibilities. In other words, if the phagocytic action of the leucocyte is dormant or destroyed through a lethal infection, to inject any serum into such a patient may be the "straw that breaks the camel's back", for there can be no reaction under these adverse conditions. If, however, in the face of such a serious situation the ill patient's blood is typed and the donor is given a stock serum which increases through its reaction the phagocytic activity of the leucocyte, and these virile leucocytes, and not the serum, are segregated and injected into the infected patient, the direct effect may be that of boosting the tired horse up to the top of the hill. His theories are most logical and his technic that of a master.

DR. HIRAM N. VINEBERG, NEW YORK CITY.—It seems to me that the trend of gynecologists has been to ignore the local condition entirely; they believe that it should not be touched. As an illustration of this we had a case reported at the New York Obstetrical Society recently, from a very good clinic, where the woman had been delivered; she had a large fibroid which became infected and the patient was markedly septic and she was allowed to die without any surgical interference. I asked why she had not been operated upon. The reply in rather a contemptuous tone was: "We do not operate for septicemia in our clinic." Now, I could never quite understand the position of our colleagues in that respect. In the case reported by Dr. Piper, the patient was treated surgically in addition to the injections of the mercurochrome. In many of these cases of septic infections, as I have demonstrated in my own practice, there may be a surgical condition which if attended to will help considerably any other treatment and may aid in the cure of the patient. Take the case of Dr. Brettauer's: That probably may have been a case of gangrene of the endometrium. I have not infrequently seen such conditions. Remove the source of infection and the patient surely has a better chance to recover. If such a gangrenous endometrium is allowed to exist there is a constant source of reinfection and it is expecting too much from any bactericide that it will prove victorious. The fear so often expressed by gynecologists of spreading the infection by operating on septic tissues I have never entertained. Its fallacy was strikingly exposed in the surgery of the great war.

DR. WILLIAM R. NICHOLSON, PHILADELPHIA.—I think that in all fairness it should be definitely stated that the patient of mine to whom Dr. Piper, at my request, gave mercurochrome internally was practically hopeless from the start. She had been delivered about two days when I first saw her and at that time had a high fever and was jaundiced, and was fatally sick. I have been sorry that I asked Dr. Piper to give mercurochrome, since I do not think it is fair to expect that mercurochrome will perform miracles in moribund patients.

This woman had one of those tremendously overpowering cases of sepsis; she was in a small community hospital and there were other septic cases in the hospital at the same time. These facts I think should be taken into consideration in judging of the value of this drug. I am frankly in hopes that the work done by Dr. Piper will show the way to an agent which may have the same results as mercurochrome, without the dangers mercurochrome undoubtedly possesses.

DR. WALTER W. CHIPMAN, MONTREAL, CANADA.—Was there an increased leucocyte count after this medication? Of course, we are agreed that the action of the mercurochrome is not directly upon the organism, but that these non-specific irritants merely increase the leucocytosis and that it is the leucocyte that attacks the organism.

DR. BARTON COOKE HIRST, PHILADELPHIA.—I have had an opportunity to observe Dr. Piper's work from the beginning. There has been some confusion about the priority of this method of treatment. Anybody who reads the recent literature on the subject would, I am sure, be quite confused as to whom the credit for this treatment is really due, and to make that clear, at Dr. Piper's request, I am publishing a review of his cases, with which I have really had nothing to do except as an observer, but as an observer I have been naturally intensely interested.

I have had the skepticism to which Dr. Miller refers, but one thing appears plainly from this study: it is possible by a chemical disinfectant to sterilize the blood. That is an epoch-making observation. Whatever becomes of this method therapeutically, if one can sterilize the blood, it must be in many cases an advantage to patients.

The patient apparently gets well by establishment of an immunity. Is this contributed to by an enormous autogenous vaccine? There is a tremendous destruction of the microorganisms throughout the system, and there is an autogenous vaccine in huge doses by this method. Whatever the explanation, I have been converted, having begun my observation of these cases with the same feeling of doubt as to the outcome that every one has who has seen so many methods tried without success. At any rate, one fact has been established: it is possible by a chemical disinfectant to sterilize the human blood stream.

DR. ISIDOR C. RUBIN, NEW YORK.—It is interesting to note the suggestion made by Dr. Hirst about what happens in the blood following the injection of mercurochrome; that is, in the destruction of the bacteria there results an auto-vaccination. The proponents of the nonspecific protein therapy claim that even in the specific vaccine therapy it is not the autovaccination that cures but that it is the protein that is released by the destruction of the bacteria themselves that stimulate all the defensive forces that arouse the leucocytes such as Dr. Chipman mentioned.

DR. PIPER, (closing).—I would say to Dr. Miller that I was aware, of course, of all the skepticism on intravenous medication. Every one of those previous methods of intravenous antiseptic medication were empirical. This work was based on a question of dilution in the blood stream. In the dosage that we worked out we give from 5 to 7 or 8 milligrams per kilo of body weight, and that will give a dilution in the blood stream anywhere from 1-16000, or as concentrated as 1-13000. We also showed that the organisms were killed, at least, insofar as we can believe the laboratories. We likewise got an increased leucocytosis. I do believe it has some effect, but I am partially convinced that in the successful cases we create an autogenous vaccine through the destruction of the microorganisms themselves, by the fact that they do not show any reaction usually, in spite of the dosage, where there is nothing in the blood stream.

Again, in reply to Dr. Miller, naturally Dr. Young is quite in favor of the colon bacillus; it is much more easily cured. If he has streptococcic infections in blood stream, they will not all get well no matter what is used. I will give mercuro-chrome to anybody; if we can get 20 per cent cures in staphylococcic infection of the blood stream in puerperal cases, I think it is better than anything else that has been done in practically moribund cases.

As to Dr. Brettauer's question, I cannot say where the localization will occur, but they get well when they begin to localize, and if the infection will occur super-ficially or as a pseudomyelitis, they usually get well after a time. Of course, we go after local infections whenever we can find them. I saw a case a few days ago and found an osteomyelitis of the inner side of the tibia; that was not a septicemia but a bacteremia. She had been carrying the infection through the blood stream, but it was not increasing.

DR. KARL M. WILSON, Baltimore, Md., presented A Morphologic Study of Some Phases in the Development of the Sex Glands of the Domestic Pig. (For original article see December issue, p. 710.)

DISCUSSION

DR. JOHN G. CLARK, PHILADELPHIA, PA.—This paper recalls some observations which I recorded in a study of the circulation of the ovary some years ago. Dr. Wilson alludes to the radical difference in the circulation of the ovary and the testicle. In following the scheme of the ovarian circulation back to a stage

in the embryo when it was so small that the aorta required the blunt end of a hypodermic needle to inject it, I could immediately differentiate the sex by the way the injection fluid appeared in the genital hillock on the wolffian body. If it spread over the hillock through a dorsal branch with hoop, or bandlike radicals, it was of the male type; if on the other hand, it entered the base of the hillock and spread out fanlike it was a primitive ovary. In the ovary of the newborn infant, the graafian follicles are fully differentiated and make up almost the entire ovary, whereas by the time puberty is reached the follicles occupy the peripheral or cortical zone. A vast number have disappeared and the blood vessels and stroma occupy the central space. In adult development blood vessels of no organ in the body possess a more pronounced corkscrew tortuosity. Based upon these observations, I offered a theory that through the wavelike congestion, making up the ovarian and uterine physiologic cycle, the follicles are pushed to the surface and rupture facilitated. Furthermore, based upon this same observation it was suggested that the wide age interval of the menopause, forty to fifty years, may depend upon the blocking of the cortical or follicular circulation. In one instance, the peripheral zone may be blocked early with inefficiently removed corpora lutea, such as are so constantly seen in the menopausal years, as corpora fibrosa, albicantia and nigra, and under these adverse conditions the development of the follicle and corpus luteum are so much thwarted that the climacterium occurs early. In the face of this vascular limitation, induced through stromal fibrosis, the follicles cannot mature and corpora lutea are no longer developed. A woman with a central circulation in the genital gland is definitely limited in fecundity to the menopausal years, whereas man with a peripheral circulation in the testicle, has no limiting years of sterility. In well vascularized ovaries, such as are particularly observed in women who have borne many children, the menopause usually occurs late, even beyond the half-century mark. Likewise, the menopause comes late in women with the larger myomata because of the increase in pelvic circulation. Certainly the menopause is not induced by the disappearance of ova for they may be found in women well beyond the menopause.

DR. WILSON, (closing).—I hope I have not left the impression that sexual differentiation appears at a late day. One can tell from the histologic picture whether the embryo is a male or female. Of course, most of the theories with regard to the determination of sex go back to the time of fertilization, but you cannot study the ovum at this time.

DR. JOHN A. SAMPSON, Albany, N. Y., read a paper on **Endometrial Carcinoma of the Ovary Arising in Endometrial Tissue in that Organ**.*

As endometrial tissue in the ovary not only has the histologic structure of the uterine mucosa, but also reacts to menstruation, pregnancy, and the menopause, as does the latter, it is natural to assume that it would be liable to similar pathologic changes if exposed to the exciting cause, and carcinoma could arise in it.

It is of frequent occurrence, having been observed by me in 64 of 332 abdominal operations for pelvic conditions during last year. One of the most striking features of patients with benign endometrial lesions in the ovary or ovaries and their often associated benign peritoneal implantations, is their close resemblance to malignant ovarian tumors and their often associated malignant peritoneal implantations. Ovarian carcinoma frequently has the same histologic structure as carcinoma arising in the mucosa lining the uterine cavity. Carcinoma of the ovary is of frequent occurrence compared with carcinoma of the testicle, yet both organs have a com-

*Author's abstract.

mon embryonic origin. This acquired endometrial tissue in the ovary would in part account for this frequency. All this is valuable circumstantial evidence, but it is not conclusive. There is needed the demonstration of both benign endometrial tissue and carcinoma in the same ovary, the two bearing the same histologic relation to each other that is found in carcinoma of the body of the uterus; to indicate the possibility of the origin of the cancer in this tissue and to make it conclusive it must be shown that it actually arose in this tissue and is not invading it from some other source.

In the larger group of cases with ectopic endometrial tissue, the amount of that tissue in the ovary is small and is usually situated on or near the lateral or under surface of the ovary. The associated peritoneal lesions (if present) are usually few in number. Should cancer arise in this tissue it would obscure or replace it and malignant peritoneal implants would usually occur early and would also be apt to cover up any benign endometrial implants possibly present. In the smaller group an endometrial cyst is present and the associated peritoneal implantations are usually much more extensive than in the former group. Should ovarian carcinoma occur in a patient in this group it is usually possible to detect the benign endometrial tissue in some portion of the specimen including the ovary in which the cancer has arisen.

Nineteen specimens of ovarian carcinoma were studied to ascertain whether or not the carcinoma could have been of endometrial origin.

Three were associated with cancer of the body of the uterus.

In four specimens the carcinoma arose in the epithelial lining of an apparently benign ovarian cyst and was associated with a benign endometrial invasion of the wall of the cyst and also of the posterior uterine wall to which the malignant cyst was adherent. In two of these the original cysts were obviously benign endometrial cysts. In the third the cyst was of the type of a serous papillary cystadenoma, but the conditions found indicated that this cyst could have arisen from implanted endometrial (possibly tubal) tissue. In the fourth the malignant cyst in places suggested a previous pseudomucinous cystadenoma. The relation between the benign endometrial tissue in the ovary and the malignant epithelial lining of the cyst was such as to indicate that either the cyst primarily arose from this tissue or the endometrial tissue was being invaded by carcinoma arising in the cyst and the latter was not of endometrial origin.

In three specimens histologically benign endometrium-like tissue was found on or near the surface of the ovary and cancer was found replacing its epithelium or arising from it.

Some of the other ovarian carcinomas not demonstrated to be of possible endometrial origin nevertheless could have been.

The study of this small group of cases shows that some, and suggests that possibly a large percentage of ovarian carcinomas are of endometrial origin which is in accord both with the frequency of endometrial tissue in that organ and with the endometrial type of many ovarian cancers.

DISCUSSION

DR. JAMES R. GOODALL, MONTREAL, CANADA.—A new chapter has been opened in gynecology, and what strikes one most in regard to these adenomyomatous structures is that their great frequency has been demonstrated. In his paper today, as I understood it, the primary object was to demonstrate that these tumors are susceptible of malignant change. When we study these endometrial tumors we find that they have the power of transplantation, and that whenever they are transplanted they grow in a manner which invades to a great degree structures of the uterine wall which resist, as we all know, infection. They cause

by their irritating effects reaction round about the endometrial tissue, and they have also the factor of drawing out blood of a menstrual nature, which must also cause considerable irritation. Here we have ectopic tissue with all the potentialities of malignancy. And in one of Dr. Sampson's tumors, skepticism must be completely buried, because the transition from the endometrial tissue to the malignancy could be convincingly demonstrated. Dr. Sampson thinks it is possible that in the other case a smaller cyst in the immediate neighborhood may have burst and invaded the endometrial cyst.

An interesting question arises with regard to these implantations. What happens to them in the course of the sexual life of the woman? Either we must conclude that they grow exceedingly slowly or that at some time or other they retrogress because cases will occur where the invasive process has gone quite wide of the point of implantation, involving the rectum and the rectovaginal septum. But if these implantations take place early in the woman's sexual life and they do not become malignant, except possibly on rare occasions, then the inference is, I think, quite clear that their growth must be exceedingly slow.

Of course, the point of greatest interest is the origin of this endometrial tissue. Dr. Sampson has advanced a very ingenious explanation, and that is the drip from the fimbriated end. This may be stimulated by many causes, possibly by dilatation of the cervix, forcing the blood out through the tubes, or there are many other conditions which might arise to cause back pressure. There are other conditions which we must envisage from a scientific point of view; they are probably these: If we make sterile sections of normal ovaries to determine what structures there are in which the tumors may arise, we find that the fimbria ovale where it joins up with the ovary invades the ovarian tissue to a more or less degree in about 30 per cent of cases with typical endometrial tissue, but these may be unaccompanied by interstitial tissue which we almost invariably find in connection with the endometrial implants.

The second important thing is, is this a metaplasia? I think it would be rather far-fetched, although in the bitch and in the cat I have frequently demonstrated that the surface epithelium of the ovary may change in its character, take on cilia and a variety of cells can be found in the lower animals showing that this tissue has potentiality for differentiation which we should expect, knowing its origin and the structures to which it may give rise.

Discussing Dr. Wilson's paper on embryology, I have gone into this rather intensively in comparative anatomy in young animals and we find that the ovary at one time has as complete a set of tubules running to its surface as has the testicle, but they atrophy because afterward in some of the animals, especially the pig and the bitch, we can demonstrate the central body in the ovary which corresponds to the epididymis in the male. This has also been taken up by myself in the human and it is extraordinary how rarely we find a human ovary which has these structures which have not undergone atrophy or complete destruction.

This leads us to the question, are these ovarian ectopic tissues but the primary origin of these growths? If any of them take on activity, as they frequently do, we find that the lining of these structures shows a multiplicity of characters so differing that it seems almost impossible that they should arise from one type of tissue, but knowing the character of tissue from which they arise, and bearing all the character of the tissue of the ovary, our surprise is perhaps less marked.

DR. EMIL NOVAK, BALTIMORE, MD.—Like Dr. Goodall, I am frank to say I came in a somewhat skeptical frame of mind, but, like Dr. Goodall, I left as a convert. I believe Dr. Sampson has made the most important contribution of recent years in the field of gynecology. With regard to his first case of endometrial carcinoma of the ovary, I can find no flaw in his interpretation. He has demon-

strated a cyst lined by perfectly definite endometrium with perfectly definite carcinoma arising in it. His other three cases were much less convincing to my mind, for in all of them it seems just as likely and perhaps more plausible that the carcinoma had arisen in a previous cystadenoma of the ovary. But, as Dr. Goodall has said, the one case has established the principle and, while we may not agree that most carcinomas of the ovary are of endometrial origin, I do not see how we can deny that some of them are.

With regard to the general subject of Dr. Sampson's implantation hypothesis, I may say that Dr. Sampson has taken a very fair-minded position. Many investigators believe that the endometrial islands found in various points in the pelvis are due to peritoneal metaplasia. I shall not go into the evidence in favor of this viewpoint, but it is not unimpressive. On the other hand, in many of Dr. Sampson's sections, the endometrial areas certainly suggest something plastered on from the outside. The matter of regurgitation from the tube is still an open one. I have discussed it with embryologists who look upon the menstrual regurgitation idea as extremely improbable. Furthermore, I may say that in a recent series of twelve cases, in which the operation was done during menstruation, no blood was found in the pelvis of any patient. To sum up, it seems to me that Dr. Sampson has shown conclusively the occurrence of definite endometrial tissue in various locations in the pelvic cavity; that he has made out a good case for the implantation theory; and that he has shown that at least some cancers of the ovary arise from endometrial tissue in the organ.

DR. SAMPSON, (closing).—Dr. Goodall brought up the question of the influence of pregnancy on ectopic endometrial tissue. It is identical with that on the mucosa lining the uterine cavity as far as a decidual reaction is concerned. We find these decidual implants more frequently in certain groups of patients and less frequently in others. They occur more often and are usually more markedly developed in women who have not had children (or none in several years) and who are operated upon for uterine leiomyomas, retroflexion of the uterus and conditions resulting from endometrial implantation. We find them much less frequently in operations for the relief of conditions resulting from the injuries of childbirth and from pelvic inflammatory disease. It would seem that pregnancy or the results of pregnancy may lessen the incidence of these implants or may actually cause a retrogression of any already present.

I wish again to emphasize the frequency of ectopic endometrial tissue. During this last year, representing a little less than eleven operative months, 98 instances of this lesion were encountered in 332 abdominal operations for pelvic conditions. In all of these cases some of the ectopic endometrial tissue was examined microscopically and all showed the histologic structure of endometrial tissue as found in the invasion of the uterine wall by the mucosa lining its cavity. The implants may be present only on the peritoneum or only on the ovaries, more frequently on the peritoneum, but often on both. In sixty-four of the cases one or both ovaries were involved.

DR. JAMES C. MASSON, Rochester, Minn., presented the report of a **Case of True Hermaphrodism**. (For original article see page 81.)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF OCTOBER 14, 1924

The President, Dr. R. M. Rawls, in the Chair

Dr. Howard E. Lindeman presented the following case reports, (1) **Intrauterine Pregnancy Following Two Tubal Pregnancies, (2) Three Successive Tubal Pregnancies in One Patient.**

CASE 1. Miss D. R., age twenty-nine, was first seen October 11, 1919, having been bleeding constantly for seventeen days. She had been operated on four and a half years previously for chronic appendicitis, and six months later her gall bladder was drained, and she received medical treatment for a gastric ulcer. A year later a perirectal abscess was incised and drained. There had been no pelvic symptoms at any time.

Her menses which began at fourteen, had always been regular and four-weekly up to two years before, since which time they occurred irregularly at two to three week intervals. They had always been of six day type, moderate in amount and without pain. What she called her last period had occurred on September 21-27 and was apparently normal. Three days later she began to bleed again and bled constantly up to her visit to me. The amount was about the same as at a regular period. There had been no clots and no pain. The blood had been bright at times, dark at others, and for two or three days had had a foul odor.

On examination I found an apparently healthy, well developed, young woman. The hymen was lacerated and the introitus readily admitted two fingers. The orifices of the Skene and Bartholinian ducts were not reddened and there were no vulvar signs of gonorrhea. There was a small erosion surrounding the external os and a moderate bloody discharge from the cervix which was otherwise negative. The uterus was anterior, freely movable, moderately enlarged and softened. The right adnexum was apparently normal, but a small, soft, tender, cystic mass could be felt on the left side. No definite diagnosis was made.

Three days later, October 14, the patient had a sudden attack of cramps in the left lower quadrant and felt faint. The bleeding had remained about the same. At this time her temperature was 99.6° and her pulse 76. A diagnosis of ectopic gestation was made and she was operated on at the Misericordia Hospital a few hours later. On opening the peritoneal cavity a small amount of free blood was found. The right tube and ovary were normal. The left tube and ovary were prolapsed and adherent to the broad ligament and there was a swelling about the size of a walnut at the junction of the outer and middle thirds of the tube. A few small blood clots were protruding from the fimbriated end of the tube. A left salpingectomy was performed, the line of section passing through and leaving part of the ovary. The raw surfaces were peritonealized and the wound closed in the usual fashion. The specimen showed a typical tubal pregnancy, unruptured, and with a pea sized ovum in a mass of clots.

On January 7, 1920, just a little less than three months after her first visit this patient again came to my office with the statement that she "has one on the other side." Her last period had been on November 29. On December 20, one week ahead of time, she had spotted for seven days, had stopped for a week and then had bled freely for one day and moderately up to the time of her visit.

On that morning she had passed a smooth piece of membrane. For two weeks there had been colicky pains, at times sharp and radiating into the thighs, morning nausea, occasional vomiting and dizziness once, but no fainting. The pains were exactly like those on the previous occasion.

Examination showed a soft cervix with moderate bloody discharge, an enlarged uterus, and a small tender mass on the right side.

She was operated on at Flower Hospital two days later. A small amount of free blood was found in the abdomen. The left broad ligament stump was found rigid and short, but not thickened. In the right tube at the junction of the outer and middle third was a typical appearing ectopic pregnancy about 2 cm. long and one cm. in diameter. As the patient was still unmarried and might desire a pregnancy at a later date a conservative operation was considered advisable. The tube over the ectopic was split and an attempt made to shell out the ovum. But it was so adherent to the tubal walls that considerable damage to the tube resulted and it was finally necessary to resect the distal third of the tube, through the dilated site of the pregnancy. The walls were then cuffed back on the tube and sutured in position. The wound was closed in the usual manner and the patient made an uneventful recovery.

Following this the patient was perfectly well and with normal regular periods up to May 2, 1923, about three years. The next period did not appear and when two weeks overdue a diagnosis of pregnancy was made. I did not see her on this occasion. As the patient was still unmarried, she had an abortion performed June eighteenth. She has been perfectly well since, and has had no further pregnancies. She is still single but expects to be married and I hope that at some future date I may be able to report to you that this patient has had a full term pregnancy.

CASE 2. Mrs. F. H., (181170), twenty-four years old, was admitted to Brettauer's service at Mount Sinai Hospital on April 8, 1918. Her past history was negative except for frequent fainting spells for many years. Her menses which had begun at thirteen had always been of regular thirty day type, lasting three days and without pain. She had been married six years and had one child four years old. She had had an abortion performed at two months in 1916 which was followed by an infection and seven weeks' illness.

Her last regular period had occurred January 18, 1918. On February 15 she had bled for three days, stopped for two days and had then bled again up to the time of her admission to the hospital in April. At times she had only spotted, at other times she had bled freely, sometimes bright red, at other times dark. For two months she had had attacks of sharp pain in the right lower quadrant radiating into the back. There had also been burning pain at the end of urination during these two months.

Examination showed a well developed young woman not acutely ill. There was slight tenderness at and below McBurney's point and considerable dark bloody discharge from the cervix. The uterus was slightly retroposed, anteflexed and not enlarged. There was a freely movable cystic mass in the left side, but the right adnexum was clear. She was operated upon April 11, 1918. The uterus was very slightly enlarged and firm. The left tube and ovary were normal. The right tube was enlarged at its fimbriated end by an almond-sized mass and blood and clots protruded from the ostium. There was no perforation. The tube was removed in the usual manner, the stump peritonealized and the abdomen closed. Her recovery was uneventful.

Five months later, on September 30, 1918, she came to my office. She had had no intercourse following the operation until early in August. Her periods had been regular from shortly after the operation until August 12. The period

due September 10 had not occurred but on September 17th she had spotted for a few minutes. There had been no further show of blood until the night of September 28 when there was quite a gush of bright blood. On September 16 and 19 there had been attacks of severe cutting pain across the lower abdomen and this had been repeated on September 29. With these attacks she felt faint but did not lose consciousness. With this and the preceding ectopic she had had heartburn but at no other time and she therefore suspected that she had a repetition of the condition.

Examination showed a negative introitus and cervix. The uterus was somewhat retroposed, moderately enlarged and slightly softened. There was resistance in the left fornix, but there were no masses and no tenderness.

She was admitted to Brettauer's service at Mount Sinai Hospital three days later. Four days after admission, October 7, 1918, she was operated on by Brettauer. The outer two-thirds of the left tube was found to be much distended by blood clots. During the process of delivering it through the abdominal wound rupture occurred and a large mass of clotted blood escaped. The outer third of the tube was amputated and the abdomen closed, without any attempt at a plastic procedure. She made an uneventful recovery, and nothing further was heard from her until about one year ago when she telephoned me that she was again a few days overdue and spotting and made an appointment to see me at my office on the following morning. In the morning however her husband telephoned me that she would not keep the appointment as she had been suddenly taken sick during the night, rushed to a hospital and operated and another ectopic found. Since then I have heard nothing from her and all my attempts to locate her and obtain some definite facts as to the findings at that operation have been unsuccessful.

DISCUSSION

DR. JOHN O. POLAK.—The handling of these tubes depends on the type of infection. In the cases of endosalpingitis, conservation of the tube is an extremely dangerous proposition. A large number of cases occur as the result of infection following abortion, where there is a perisalpingitis. And one can take a greater risk in conservation of the tube.

DR. GEORGE W. KOSMAK.—In this connection I should take the opportunity of reporting a case in which I personally delivered a woman of six children after her first pregnancy, which was an ectopic. I think that is a pretty good argument for leaving an intact tube in place.

DR. HENRY C. COE.—I recall a specimen now in the Johns Hopkins Museum, in which Whitridge Williams took considerable interest. I reported the case twenty years ago at a meeting of the American Gynecological Society as an example of possible external migration of the ovum. There was a typical ectopic in the right tube and the ovary was sclerotic. On the left side there was a fairly normal ovary and lithopedion about the size of my fist; so that it was an interesting question as to how she became pregnant in the right tube when the right ovary was completely destroyed and the left ovary was apparently normal.

DR. ALBERT M. JUDD.—I personally believe that too many tubes which present ectopics are sacrificed. Where it is decided that a tube should be removed I believe that it should be cut out of the cornu of the uterus rather than amputating it.

DR. HIRAM N. VINEBERG.—I recall a case reported several years ago in which a tube was removed near the uterus for pyosalpinx. This woman came to my office some time afterwards, complaining of pain and bleeding from the

bowels. I believed that it might be an ectopic mass on the right side. It proved to be in the little stump which was left behind from the pyosalpinx operation. The intestine was adherent to the bowel and the ectopic had perforated into the same.

DR. FRANK R. OASTLER.—I saw a second ectopic occur in the stump of a tube in which there had been an ectopic and which had been removed at the time. To start with, the first ectopic occurred on the right side and then there was another ectopic in the stump on the same side. I operated on the patient on both occasions. I should have cut the tube out in the first place.

DR. DOUGAL BISSELL presented the report of two cases of **Hyperemesis Gravidarum Treated with Blood Transfusion.**

CASE 1.—Mrs. C., age nineteen, became pregnant about July 15, 1923, during her first month of married life. She was first seen by me Aug. 1, 1923. Her weight was 160 pounds, height 5 feet 9 inches, appetite good, no nausea or vomiting. The uterus was completely retroverted; corpus was replaced and held in position by a well fitted Emmet pessary. On Aug. 14, uterus was in normal position but since last seen she had been nauseated every day with occasional vomiting. On Aug. 29, patient reported that nausea and vomiting were persistent. She was allowed to leave the city on a visit of a few days, during which time there was very little nausea and no vomiting. Returning home by water she encountered a severe storm and became very sea sick. On Sept. 6 the corpus was again retroposed. The pessary was removed, corpus again replaced and held in position by cotton tampons which treatment was continued until Sept. 28 when it was discontinued for a time because of considerable blood being found on the tampons. From Sept. 10 to Sept. 28, patient was kept in bed on a dry diet and during the latter part of September there was less nausea and vomiting. On Oct. 2 the uterus was in a very low position and the muscles of the vaginal outlet greatly relaxed —cotton tampons were again resorted to but discontinued after one week because of a bloody discharge. Although vomiting was not quite so persistent, patient had lost 50 pounds. Urine at no time showed kidney pathology, blood examination Oct. 10 showed a decided diminution in the number of red corpuscles with a somewhat low leucocyte count and a normal differential count. Hemoglobin 50 per cent.

On Oct. 12, 1924, transfusion was agreed upon with the hope primarily of improving her general condition and saving the child, not with the definite purpose of stopping emesis. Two hundred fifty c.c. were agreed upon as a probable safe amount to begin with.

The patient was admitted to the hospital Oct. 12, 1924, temperature 99.2°, pulse 96, and persistent pain in the lower abdomen. On Oct. 13 blood chemistry examination, CO_2, 48; blood urea nitrogen 10.5 mg.; blood sugar 0.11 per cent; Group II, hemoglobin 45 per cent, blood pressure 112 over 68. During the morning of this day, patient vomited a number of times, complained of feeling very tired. Just before transfusion, she was given a little minced chicken, toast and tea. At 2 P. M., 250 c.c. of blood were given by the Unger method. The patient rested comfortably until 8 P. M. when she became nauseated but did not vomit. Bromide of soda 40 gr., chloral hydrate, 20 grs., were given by rectum. Patient had a comfortable night. No reaction followed transfusion.

On Oct. 14, she retained roast beef, toast, asparagus, minced chicken, rolls and tea. This diet with slight variation was continued each day after. At no time after transfusion did she vomit food. Three days after transfusion blood showed marked improvement, hemoglobin 65 per cent. Before transfusion the patient

was mentally depressed but within 24 hours after transfusion there occurred a marked change in this respect.

The patient was delivered of a normal child about two weeks before the expected time of labor.

CASE 2.—Mrs. B., age 31, married thirteen years, one child eleven years old. Last menstruation, May 2-5, 1924. Was first seen by me July 25, 1924. Since May 30 has been vomiting after every meal and often between meals, during the past seven weeks has lost 10 pounds, occasional headaches, very nervous, does not sleep well, occasional constipation and at times resorts to cathartics and enemas. Patient was advised to rest in bed and was given a limited dry diet for ten days, without relief. She was then sent to the hospital. Again a limited dry diet treatment was followed for eight days, but emesis persisted. Hypodermatoclysis was administered once. Glucose 5 per cent, and soda 2 per cent—6 oz. per rectum on three occasions. Murphy drip was attempted several times but unsuccessful because of the loss of sphincter tone. Urine and blood normal—each day, however, she was losing ground physically and her mental depression was becoming a serious problem. As the blood was normal in this case, no thought was given to the idea of transfusion when she was sent to the hospital, but when it was found that relief was not afforded by rest and diet under close observation, transfusion was resorted to empirically. On Aug. 12 she was given 250 c.c. of her husband's blood; both belonged to Group IV. No reaction followed—on the following day she vomited three times but slept well that night and felt greatly improved mentally the following morning.

From this date on she ate heartily and only once vomited her food. On two other occasions slight emesis occurred but at times when the stomach was without food. The most striking change following the transfusion was in the mental attitude of the patient, for within 24 hours her depression had ceased, she smiled for the first time in months and though occasional vomiting occurred as noted, she was not in the least discouraged. She was last seen Oct. 8 no vomiting had occurred since leaving the hospital and she is in the best of health mentally and physically. Labor expected Feb. 12, 1925.

It will be noted in neither of these cases was there discovered pathology in any of the organs. The loss of flesh and physical strength and the poor blood picture were in addition to persistent vomiting, the outstanding features of the first case. In the second case we find comparatively little loss of flesh, great mental depression but no change from the normal blood picture.

DISCUSSION

DR. ASA B. DAVIS.—About eight years ago, Garnett, of Washington, reported as I recall it, five cases in which he had employed transfusion for hyperemesis gravidarum, with excellent results. Soon after this report appeared a patient was admitted to the Lying-In Hospital who had been previously carried through what we considered a very serious period of pernicious vomiting, recovered under treatment and was safely delivered of a full term living child. On her second appearance, her condition was even worse than in her former pregnancy. On the strength of Garnett's report I gave her, I believe, 800 c.c. The result was as pronounced as it is after a severe acute hemorrhage. She went on to full term, her general health improved immediately, and she was delivered of a living child. Soon after this another similar case was admitted whom we transfused in the same way hoping for like results, but in so far as we could see there were no results from this treatment, and it was discontinued thereafter in such cases.

In relation to the use of serum, I would like to say that in many of these cases of hyperemesis, even if the pregnancy is terminated, they are so depleted that some pass out no matter what form of treatment is employed. Some years ago, Welch, Pathologist at the Lying-In Hospital, brought out the serum treatment for hemophilia. We tried serum in one of the cases of pernicious vomiting after the uterus had been emptied. A considerable number of her relatives came forward and supplied blood for the serum which was given to her daily by hypodermic in the cellular tissue. It is my recollection that in the course of one week something like eight quarts of blood were employed for this purpose. The patient finally recovered. I recall Welch's theory at that time was that this serum furnished easily assimilable nutrition when the patient was unable to digest or absorb food.

DR. HAROLD BAILEY.—It was my impression that the two cases reported by Bissell were the first cases in the literature in which transfusion aided the patient so that she could go on with her pregnancy. The first report that I know of was by the late Dr. Lindeman. In his case the uterus was emptied and a transfusion done. The patient was in a very serious condition but recovered. However, this method of treatment is not always successful. I have three cases which I have transfused. One woman received 600 c.c. of blood and although the blood matched, she showed symptoms of hemolysis and the transfusion had to be stopped. For a time there was improvement but eventually, after losing 40 pounds, the uterus had to be emptied. A second woman was transfused on the same day, receiving 500 c.c. of blood by the citrate method. She improved temporarily but it was necessary to empty her a week later at which time she had lost 32 pounds. The third case had all the signs of acute yellow atrophy and had been operated upon for appendicitis. She was very much jaundiced and comatose when she was admitted to my ward. She was emptied and transfused on the same day and recovered.

In 1911, two Germans, Freund and Mayer, gave normal pregnancy serum to women who were vomiting and found that the results were very good. They later found that it was not necessary to give normal pregnancy serum as normal human serum gave the same results. However, I tried the pregnancy serum in half a dozen cases with great success. After these women had received about 100 c.c., which was the highest dose I gave, their condition improved amazingly and they went on to complete recovery. It seemed almost as though the serum added something which aided the body in building up a resistive substance to fight this type of toxemia.

DR. HERMANN GRAD.—In a case of very severe toxemia of pregnancy two years ago, I gave the patient blood serum from a pregnant woman after everything else had failed. I gave this woman 40 c.c. of serum on one occasion and 60 c.c. on another, with the result that her nausea stopped and she went on to full term, but became totally deaf after a normal labor.

DR. E. A. BULLARD reported a case of **Abdominal Pregnancy**.

Mrs. A. M., white, age thirty-two, was admitted to Woman's Hospital on Dec. 10, 1923, with a temperature of 104.6°, pulse 125, white count 11,000, with 89 per cent polys, red cells 3,850,000 and hemoglobin 80 per cent. She was vomiting occasionally, had a chill on admission, and complained of frequent pains in lower abdomen.

Patient had enjoyed excellent general health up to the present illness. Menstrual history had been normal; married five years; and pregnant for the first time; her last menses having occurred July 18th to 21st.

Three weeks before entering the hospital she fell, striking her abdomen against

a railing. This was followed by several days of severe abdominal cramps and moderate uterine bleeding. For a week or so she felt generally better, then the pains returned she began to have fever and chills and she was referred to the hospital.

Our first examination noted a well-developed young woman obviously seriously ill. The abdomen was moderately distended, tympanitic and very tender everywhere. Vaginal examination revealed a symmetrical uterus apparently five months' pregnant. The cervix was soft, not dilated and no bleeding present. Repeated auscultation failed to discover a fetal heart.

A diagnosis of accidental hemorrhage with partial separation of the placenta, death of the fetus, and infection was made.

As the patient's condition seemed to be growing worse, we felt that the uterus should be encouraged to expel its probably infected contents. Accordingly, three days after admission, a rubber tube and gauze were packed into the cervix and lower uterine cavity. This was repeated but failed to excite uterine contractions. Finally, on Dec. 20, six days after the first attempt at induction of abortion, as the patient's general condition was decidedly worse, vaginal cesarean section was undertaken. To my amazement, after I had split the anterior lip of the cervix, I found the uterine cavity only four inches deep and empty. We now realized that we had an ectopic pregnancy to deal with, but because of the patient's very poor condition I decided not to add any more operative shock that day.

On the following morning the picture of general peritonitis was more severe; pulse feeble and averaging 140, temperature 103°, abdominal distention pronounced and vomiting frequent.

Under local anesthesia the abdomen was opened rapidly. Foul smelling bloody serum and many old clots welled out and peritonitis was obvious. A large placenta was found in the left lower abdomen well above the uterus and apparently attached only to loops of intestines. Lying behind the placenta with its head upon the bladder was a fetus of about five months. I cautiously extracted the fetus which was dead but not macerated, and ligated and cut the cord. Delivery was followed by a profuse gush of fresh blood, undoubtedly from accidental separation of some portion of the placenta. This hemorrhage was promptly stopped by packing five large laparotomy pads under the placenta. The incision was rapidly closed with the tapes attached to the gauze pads protruding from the lower end, and the patient left the table seemingly no worse for the operation. A transfusion of 500 c.c. of blood was given immediately by the Unger method. In spite of this her condition became steadily worse and she died about four hours later.

The following extracts were taken from the autopsy report of Lawrence Strong.

Two thousand cubic centimeters of bloody serous fluid free in the abdomen,— most purulent in the upper abdomen. A placenta fifteen centimeters (15 cm.) in diameter presents in median line and extending to the left. It is attached to sigmoid, descending and transverse colon, to small intestines and perinephric tissues of left side. All points of attachment to the gut are dark red and greenish; in places the attachment is very firm and cannot be separated, while for the most part the attachment is loose and necrotic. No trace of membranes. Liver shows fatty degeneration. Kidneys show cloudy swelling. Uterus measures 10 x 12 cm. at fundus and wall 3 cm. thick there. Mucosa rough and hemorrhagic, does not appear thickened. Right tube 12 x 1 cm., fimbric extremity obliterated, lumen admits probe. Left tube 9 x 1 cm., lumen not visible, does not admit probe. The outer extremity was continuous with the sac of the ectopic. Neither ovary identified, microscopic examination showed.

Right tube near outer end shows minute lumen with few rudimentary plicae and muscular wall slightly developed.

Left tube; outer end more rudimentary than right, no plicae. Section from tip of left tube shows some plicae which are short and low.

Section from left mesosalpinx shows a few corpora fibrosa in a dense ovarial stroma. This was from a whitish nodule 1 cm. in diameter. No ovarial tissue discovered on right side.

We have here a uterus hyperplastic to the degree consistent with a well advanced ectopic gestation. The hyperplasia is of the muscular wall and not decidual. The tubes are of approximately normal length but markedly aplastic in muscular wall and mucosal development. This is explicable either as rudimentary development of the tubes or possibly as representing the isthmic portions greatly elongated through tension. This latter explanation does not obtain, however, since the condition is bilateral and neither tube shows any ampullary portion. The ectopic gestation is an abdominal one, presumably originating on the left side since the right fimbric extremity was closed. Neither tube exhibits any sign of an original tubal nidation (hemorrhage, or inflammatory reaction). We have one atrophic ovary, the left at a considerable distance from and entirely uninvolved in the gestational tissues. Since no trace of the right ovary was found, of course we cannot deny the possibility of a right ovarial nidation, but there is nothing to suggest this.

DISCUSSION

DR. HERMANN GRAD.—There are two important points to consider. The first is the very great difficulty in diagnosis. The patient gave a very clear history of trauma, and we made a diagnosis on that basis. On palpation, it was very difficult to say that there was anything else but a pregnancy. The autopsy, however, showed an entirely different condition. I believe this death was due to a severe injury to her intestines. There was a big abscess under the large bowel which, it seemed to me, was in no way connected with her abdominal pregnancy. She was a very sick woman when she came to the Hospital. Nothing radical could be done and we simply thought that by inducing labor perhaps she would expel the dead fetus.

As regards primary abdominal pregnancy, it would be very difficult to prove this because we know in ectopic after the tube expels the products of gestation, the tube recovers and becomes normal afterwards. That was what Dr. Strong found in this case.

DR. ASA B. DAVIS.—I have seen eight cases of abdominal pregnancy, all beyond the fifth month of gestation and in each there was one outstanding symptom, sensitiveness and tenderness upon palpation of the abdomen.

DR. W. P. CONAWAY.—I recall a case in a young colored woman who was sent into my ward for relief of an abdominal pregnancy at six months, the diagnosis of pregnancy having been made on the outside. We felt that it was a tubal condition. I operated and found a six months' pregnancy on the right side which had been apparently a tubal pregnancy. There were no adhesions. All I did was a salpingo-oophorectomy on the right side, with removal of a 5-pound baby and the placenta, which came out easily. I closed her without drainage and she made an uneventful recovery. The pathologist reported that it was more of a tubal than an ovarian pregnancy.

DR. E. A. BULLARD.—Perhaps it is of no great importance to prove whether there was a primary abdominal implantation of the placenta in this instance. The following points favor it. The tubes were of rudimentary type with no plicae and no ampullary portions. Not only was the right tube firmly closed but no right

ovary could be found. The left ovary was a very small rudimentary affair. The placenta lay in the left side of the abdomen and a long distance from the tube and ovary and there were no adhesions or any connection between either adnexa and the placenta. Dr. Strong contends that microscopic examination always finds an area of evidence of a previous implantation in any tube that has once contained a pregnancy. These tubes showed no trace of such changes. It seems to me that our evidence in favor of a primary abdominal nidation is strong.

I heartily accept Studdiford's suggestion that we should have passed a sound before doing vaginal hysterotomy.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF JANUARY 3, 1924

The President, Dr. William E. Parke, in the Chair

Dr. Howard A. Kelly, of Baltimore, read by invitation a paper entitled **Curettage of the Uterus on the Office Table—a Routine Procedure.** (For original article see page 78.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—Kelly's procedure seems to possess all that he claims for it, there being but three objections. I do not believe that it is only necessary to obtain merely a small amount of tissue. In a suspected case it is important to have all the endometrium if a diagnosis is to be made. The second point I take exception to is the diagnosis of unstained tissue. The third objection is the performance of curettage without the use of an anesthetic. I believe that with the use of nitrous oxide anesthesia even so trivial a procedure as diagnostic curettage can be carried out better and to the greater ultimate satisfaction of patient and physician if it be done in a more formal manner. However, the advantages Kelly mentions, namely, the saving of time is an important factor and the saving of anticipation on the part of the patient is valuable.

DR. BROOKE M. ANSPACH.—As Schumann has intimated, it seems almost like heresy to disagree with Dr. Kelly for he has been the leader in gynecology for many years and yet I cannot help but disagree with him in this instance. First of all, I should consider it problematical whether any method of disinfection of the vagina short of thorough scrubbing of the vaginal walls and the use of a disinfectant solution, as preparatory to curettement, would be sufficient. Years ago, when the parts were prepared for operation before anesthetization, a bivalve speculum was introduced into the vagina and by rotating it in various directions and using gauze sponges with plenty of green soap and water, all parts of the vagina were gently but thoroughly cleansed and then an antiseptic solution was used in the same way. In later years we have been in the habit of scrubbing the patient after anesthetization when, of course, the muscles are relaxed, and especially in a multiparous woman, there is ready access to all parts of the vagina. It seems to me that any method of disinfecting the operating field which is not as good as it can be made, does not properly prepare the patient for operation.

Another objection to the procedure Doctor Kelly advocated is the inaccessibility of certain parts without an anesthetic. It is necessary for diagnostic curettement, in order to exclude carcinoma, to make sure that every part of the endometrial cavity is curetted, to preserve all of the scrapings and to cut sections from every part— otherwise, we may overlook a very small and beginning carcinoma. How can we

be sure, without anesthesia, that we have reached every nook and cranny of the inside of the uterus; indeed, there are some cases in which there is distortion of the uterine interior as the result of myomata when even with anesthesia certain parts of the endometrium are inaccessible.

When one speaks of diagnosing carcinoma with a pocket lens, he is treading on dangerous ground. Even with the most suitable fixation and preparation of tissues one is many times obliged to study a large number of sections in order to be able to say whether a malignant condition existed or not. This is not unusual in borderline cases. If, with a high powered lens and the best prepared sections, there is any doubt, how much could be expected from the pocket lens? It would seem to me little more than naked eye judgment. The gross appearance of the curettings in many cases gives us what proves to be a correct opinion, but we can only verify such an opinion by a histologic examination.

I have no doubt that in Dr. Kelly's hands, skillful master-surgeon that he is, curettement in the office has done no harm and may be productive of satisfactory results—but, for myself and for the majority of even those who specialize, I think it would be a very unwise practice.

DR. CHARLES C. NORRIS.—In cancer of any part of the body, the chief point of prognostic value is early diagnosis. At a recent meeting of this Society, M. E. Vogt and I reported the end-results secured in a series of 115 cases of carcinomata of the fundus. Of these, about 25 per cent were early cases. At the time of writing 59 per cent of this series are dead and only 31 per cent of three year cases were alive. The figures are sufficient to emphasize the importance of the early recognition of this neoplasm. Any means which will facilitate an early diagnosis is therefore welcomed. In advanced cases, the clinical diagnosis may be easy, but in the early cases, particularly those occurring prior to the menopause, the clinical diagnosis is always difficult and in many instances impossible. From the figures previously quoted, it is evident that it is the early recognition of this tumor that is important.

Vogt and I referred to the Clark test, which consists in the gentle and aseptic raking over of the endometrial cavity with a sterile sound. Whereas this is not an absolutely certain test, it nearly always produces a little bleeding if cancer is present and the absence of bleeding goes a long way in excluding carcinoma. This is an office test, requires no special instruments and is suitable for the use by the general practitioner and for this reason is of special value. Kelly's suggestion goes a little further and in the hands of an experienced gynecologist is, I am sure, a safe and valuable procedure.

Diagnosis from curettings is possible in practically every case, but to make the diagnosis, the pathologist must have the tissue. I do not believe that an office curettage without an anesthetic can be as complete and as certain to provide the pathologist with the cancer tissue as a thorough curettage under anesthesia. The uterine cavity possesses a surface of almost 20 sq. cm. The series of fundal carcinoma previously referred to, contained a number of cancers of less than 1 cm. in diameter and R. Mayer has recently recorded instances in which the cancer has been entirely limited to a small tumor in the otherwise normal endometrium. To detect routinely such small neoplasms a very thorough curettage is necessary. In the average case, however, when the tumor projects considerably beyond the surface of the mucosa and is of large or moderate size, the curette easily detects the soft cancer tissue and Kelly's suggestion is of great practical value. If a small piece of typical carcinoma tissue can be secured, the diagnosis can be readily confirmed by the pathologist. As a general rule, however, specimens which consist of a small amount of curettings are less satisfactory for a pathologic examination than those which contain a considerable amount of tissue.

It may be taken as an axiom that unless the entire endometrial cavity is curetted

and all the tissue obtained is submitted to the pathologist, carcinoma cannot be positively excluded. Curettage is essential for the establishment of the diagnosis in the majority of early cases, nevertheless, it is questionable whether or not the trauma incident to the operation is not a factor in the production of metastasis and the spread of the disease by seeding of carcinoma cells through the tubes. We are all familiar with the method of production of Sampson's perforating cysts of the ovary and if we accept this theory, it is difficult to escape the idea that carcinoma cells may be disseminated in a similar manner, i. e., through the fallopian tubes.

Curettage breaks up the tumor and undoubtedly leaves small fragments loose in the endometrial cavity. More or less, uterine spasms also follow trauma to the uterine cavity. The ideal procedure is to follow the curettage by an immediate hysterectomy. This also saves the patient from the discomforts of a second operation. However, this is often inadvisable as, if only a small amount of tissue is secured by curettage, all of it should be subjected to microscopic examination.

Frozen sections are not, as a general rule, satisfactory, and it is preferable to run the tissue through by a rapid paraffin method, which ensures good histologic preparations. Irradiation combined with curettage, in suspicious cases, is therefore probably productive of the best results in this class of cases and should be followed as soon as possible by hysterectomy if cancer is demonstrated by the pathologist.

If by the office curettage, it is possible to demonstrate carcinoma, as I believe it would be in the majority of cases, the diagnosis is complete. In the face of suggestive clinical symptoms, a negative result would not, however, ensure freedom from cancer; certainly not with the same positiveness as would a thorough curettage under anesthesia.

DR. ISIDOR P. STRITTMATTER.—This is one procedure that can be done in the office, readily and safely. I use a 1 per cent lysol solution for cleaning the cervical canal, wipe out the cervix, then swab with tincture of iodine and use a curette somewhat larger than Dr. Kelly's. I have done this at least three times a day in the last fifteen years for diagnostic and treatment purposes and have not had any bad results. No patient has been detained in my office for longer than fifteen minutes after this procedure. However, a careful examination of the uterus should be made before the curettage is decided upon, to exclude a possible latent pyosalpinx or adhesions.

DR. HOWARD A. KELLY (closing.)—In the average case you get enough tissue because it just pours out readily. Where a very limited area is affected, say as big as a finger tip, and I have never had reason to think that I have missed such a case, the diseased area is more friable and breaks down even under slight contact with the curette. As to the certainty of a naked eye diagnosis, where the material just pours out and you feel sure you have carcinoma, no one could have been more sure than I have been on several occasions and yet I have been mistaken, for the laboratory diagnosis was "hyperplastic endometrium." I am surer when I get irregularly, lumpy pieces broken off than I am when I secure a lot of pale, mushy material. As to the diagnosis with a pocket lens that is invaluable. Of course one does not rely on that as final. Dr. Anspach, I don't clean up the vagina half as much as you do. You clean too much; the vagina does not need the scrubbing, also the patients are shaved too often for trivial purposes. If you say Clark touches the fundus with a sound and so provokes a little hemorrhage which is suggestive of cancer, it is true that I do practically the same thing with my curette, but I have the advantage of the certainty accruing from the microscopic examination which follows. I never curette big fibroid tumors in this way.

DR. GUY L. HUNNER, Baltimore, Md., read by invitation a paper on **Ureteral Stricture in Obstetrics.** (For original article see page 47.)

DISCUSSION

DR. FLOYD E. KEENE.—It is about ten years ago that Hunner first called our attention to the frequency of ureteral stricture with its symptomatology and treatment. The type of stricture which Hunner describes is one which is often bilateral, is not tuberculous, is not traumatic, and owes its origin to a periureteritis, doubtless secondary to some focus of infection, such as teeth, tonsils or sinuses. Having the greatest respect for Hunner's excellent work, I have been trying for several years to demonstrate these strictures but I have been unsuccessful in doing so with the frequency which Hunner reports. It has been proved both experimentally and many times clinically that on passing a catheter up the ureter a spasm will result. In Hunner's work he uses a large catheter with a stiff stylet mounted with a large bulb of paraffin,—consequently it is my impression that what he terms a stricture might readily be a spasm of the ureter reacting to such trauma and that we cannot look upon this as a definite organic obstruction. Hunner tells us that in many of these cases there is no hydroureter above the stricture. Such a condition is very difficult for me to conceive of, in view of the fact that with an obstruction sufficient to cause symptoms and one lasting over a long period of time, one would certainly expect a dilatation of the ureter above such an obstruction and in my small series of cases I have always been able to demonstrate such a change. Hunner, by calling our attention to this pathologic entity, has opened up a field of investigation that prior to his studies had almost entirely been neglected. That ureteral strictures do exist is, of course, not open to question but from my own experience I cannot convince myself that these strictures are as commonly present as Hunner would lead us to believe.

DR. BROOKE M. ANSPACH.—I believe that one of the reasons Hunner has found stricture of the ureter more frequently than others and why he has been able to teach us so much of value in this connection, is that he uses the Kelly method of cystoscopy, which is vastly superior to any of the water cystoscopes in making the diagnosis. The Kelly cystoscope is more difficult to use, and to obtain satisfactory results one must acquire a certain amount of skill. I have had the good fortune to have associated with me, a student of Hunner's, and I have been surprised to see how easily he finds the ureter, how little he disturbs the patient, and how superior it is in the treatment of strictures and in the performance of kidney lavage, to the water cystoscope. I agree with Keene that we must be careful in saying when we have a stricture and when we have not a stricture, and I think a 11 mm. bulb is too large to draw conclusions from. Ginsberg and I have come to the conclusion that if with a bulb a little larger than a number eight catheter there is a hang upon withdrawal, a stricture almost undoubtedly exists. We have watched a number of cases very carefully, and I am convinced that real strictures of the ureter do occur oftener than we have heretofore believed. That we must be careful not to be led astray is unquestionable, and that it is possible to attribute to ureteral stricture, symptoms which really come from an abdominal condition is quite possible. For example, in a patient who had all the symptoms of ureteral stricture, including attacks of pain which seemed typically kidney crises, I removed an ovarian cyst as large as the adult head which had a twisted pedicle. Although the stricture had not been treated, there has been no recurrence of the symptoms. Here, undoubtedly, we nearly confused one condition with the other. The definite diagnosis here was not easy, for the woman was very large and heavy-set with an abdominal wall several inches thick.

In the pyelitis of pregnancy, we have all had the experience that one passage of a catheter was sufficient to stay the disease. In other words, in order to get our culture from the kidney, we opened up the ureter with the catheter, relieved the back pressure and Nature did the rest. Many of these cases require repeated passage of the catheter or, as Doctor Hunner has advised, dilatation of the point of narrowing. While, of course, the pressure of the fetal head sometimes is the predisposing cause of pyelitis during pregnancy, from stagnation of the ureteral flow; undoubtedly, the actual narrowing which Doctor Hunner has pictured sometimes plays a part. The experience of Aufhammer of Pittsburgh might seem to bear out the assumption. In more than a dozen cases he successfully treated pyelitis during pregnancy by laying a catheter into the kidney and allowing it to remain there during the latter months of pregnancy. The catheter needs irrigation occasionally and changing once in a while, but the results have been altogether especially good. The catheter in this case, permanently overcomes the narrowing or kinking of the ureter and the out-flow of urine from the kidney pelvis is free.

DR. CATHARINE MACFARLANE.—Using the Kelly cystoscope and Hunner's technic, I have been able to locate ureteral strictures in ten cases of abdominal pain of obscure origin (with or without vesical symptoms) and in three cases of pyelitis.

In each of these cases the wax bulb catheter was arrested at a definite point in the ureter time after time. After gradual dilatation up to a five mm. wax bulb, the abdominal pain and vesical symptoms (if present) disappeared and in the pyelitis cases, irrigation of the pelvis of the kidney previously fruitless, soon brought about disappearance of pus. In most of these cases extensive focal infection was found about the teeth and it was interesting to note that the patients reported temporary exacerbation of abdominal pain or urinary symptoms after each infected tooth was drawn.

DR. LEON HERMAN.—Hunner has thrown down the gauntlet to urologists, and we have taken it up right willingly, but have been unable to convince Dr. Hunner that ureteral stricture, especially in the male, is a rather rare condition.

One of the pictures thrown on the screen interested me very much; I should consider it a beautiful example of congenital valve of the ureter.

It is an interesting fact that there should be such a wide difference of opinion regarding ureteral strictures. I think it is safe to say that the vast majority of urologists are of the opinion that this is an extremely rare condition; certainly they attach much less importance to it as a clinical condition than does Hunner. We believe that inflammation of the ureter, especially at the normal points of narrowing, is commonly associated with upper urinary infection, but the ureteritis is the result of a descending infection rather than the primary lesion. We believe furthermore that the narrowing in these cases is due to rather superficial inflammatory lesions that will disappear when the pyelitis is controlled. In cases of this kind the bulb will demonstrate narrowing, especially when a large one is passed. Hunner refers to the use of the Otis explorer by urologists in the diagnosis of urethral strictures, and rightly maintains that his method as applied to the ureter is exactly the same in principle, but he fails to remark that we employ the Otis instrument only in the anterior urethra which is not encircled by sphincteric muscles. If you pass such an instrument through the external sphincter (cut-off muscle), you will be able to demonstrate narrowing in normal persons. Again, in cases of urethritis, there may be spasmodic contractions of the weak muscle fibers encircling the penile urethra so that the instrument will give the impression of organic stricturing. The same thing occurs in the ureter, for at times we not only find it impossible to pass a ureteral catheter past a given point, but our attempts are attended by anuria through reflex suppression of urinary secretion, or

perhaps the retention of urine above the spasmodically contracted ureter. The passage of a bulb through the inflamed intramural segment of the ureter will almost surely give a "hang," but does this necessarily mean stricture that has resulted from a blood-borne infection from some distant focus? I cannot conceive of a true ureteral stricture that does not cause dilatation of the ureter, and even in cases where ureteral dilatation can be demonstrated, we cannot be sure that such a condition is not the result of inflammatory weakening of the tube walls, rather than of altered mechanics incident to stricture. And finally I would take issue with Hunner regarding the value of the evidence obtained by making ureterograms with the wax-bulb catheter. It may be assumed that a large wax bulb will prevent the return flow of the injection medium and as a result the ureterogram will end at the site of the wax bulb, but I cannot believe that this evidence is conclusive of the presence of stricture. We treat a good many cases of pyelitis in pregnant women and with the most satisfactory results, merely by the indwelling ureteral catheter, sometimes supplemented by pelvic lavage, and it may be that we cure them by the incidental dilatation of ureteral strictures, but I am inclined to think that it is because of the reestablishment of urinary drainage through the relief of inflammatory occlusion at the ureteropelvic junction.

In conclusion I would say, that while we may not agree with Hunner in all of his views, we appreciate fully the fact that he has done much to stimulate interest in the important problem of upper urinary infections.

DR. HUNNER, (closing).—I am very sorry that Keene has made an earnest effort to follow out my method and fails, and is still at great variance with the results I have obtained. The only thing I have been asking all the way through in this controversy is that the urologists investigate. Now what they have apparently been doing is to sit down and think of arguments as to why I am wrong instead of getting to work and using a common sense method of trying to find an infiltration area in the ureter, just as they do in the urethra. As soon as they begin to actually investigate, if they differ from me, then as Herman has said, there is some "grave ignorance" somewhere and you will have to leave it to future generations to determine where the trouble lies. All I ask is for men to investigate this in a straightforward way and it seems very reasonable to ask them to use the bulb, because that is the method they have taught us to use in studying stricture in the male urethra. Now as to Keene's ureteral spasm argument: there is something in that. In withdrawing a bulb there is a hang not only from the organic infiltration but from the edema that arises after the catheter enters, and probably somewhat from spasm as the bulb comes through the tender inflammatory area. In partial answer to Herman, I would like to say that I do not depend upon any obstruction I get on introducing a catheter. It is perfectly reasonable to think that we get various forms of obstruction to a catheter on its introduction. We therefore say, do not attempt a diagnosis on what you seem to feel going in, but do as the urologists have taught us in urethral work and learn what the bulb says coming out. It seems to me in the spasm element the answer is, why does the spasm always take place at the same point in the individual patient? You can follow your records of repeated treatments and find that the bulb has hung, on each occasion at the same area, or if the patient has two strictures, at the same areas in the individual ureter. I cannot imagine a spasm which can hang a bulb after a patient has been under anesthesia from a half hour to two hours. In some patients whom I have treated for stricture and upon whom I have later performed an abdominal or pelvic operation, I have first passed a catheter with a bulb equal in size to the one used at the last treatment, and then after the long anesthesia and before closing the abdomen, have had an assistant withdraw the catheter. As the bulb takes up in the stricture area, the assistant grasps the catheter at the external urethral orifice in order to measure the distance. Then as the bulb drags through

the stricture area, the ureter, viewed through the abdominal incision, can be seen to straighten out across the pelvis and the measured distance from the external orifice to the point of hang of the bulb corresponds to the former measurements made with the patient conscious. It would seem that such a test done under full anesthesia would mean organic infiltration, rather than spasm. As a matter of fact I have palpated and had my assistants palpate many ureteral strictures during abdominal operations. As to the best instrument, I think the trauma with Keene's instrument in my hands would be far greater than with the Kelly cystoscope. Probably if he tried the Kelly cystoscope he would have greater trauma than with the instrument with which he is familiar. This is delicate work and one should use the instrument which he can handle best. The point Keene makes that any stricture of long duration must show in the pyelogram is perfectly true, but you have got to correctly interpret your pyeloureterogram. The case I demonstrated, showing how little change there may be after almost lifelong stricture and thirteen operations, is a very good one. We have two classes of strictures; in one, hydronephrosis and hydroureter develop and the symptoms are usually easily and quickly cured. Two or three dilatations result in a clearing of the pyelitis, the pain ceases, and the patient is well and they do not often come back. In the other type there is often a smaller pelvis than normal and the ureter shows very slight dilatation. They are the hypersensitive type, the kidney is under constant tonic contraction to overcome the pain and they probably develop more or less interstitial nephritis in the long run. You get more patients of the hypersensitive type than you do of the hydronephrosis type. They are most difficult to treat and you often have to follow them for two or three years. These are the cases that have misled the urologists into the spasm theory. Any patient that goes back to bed after passage of a plain catheter and suffers with terrible kidney colic should not be put down to spasm, try them out with the bulb. The strictured area is traumatized with even a plain catheter, it develops edema, the lumen becomes very narrow or temporarily closed and the patient has a terrible time where you least expect it. A drainage catheter may be left in indefinitely if you irrigate frequently with weak silver solution, 1:5000, or with boric acid solution. You must pay more attention to the bladder than to the kidney when you leave a catheter in. You do not need to leave the catheter in if you dilate the stricture. In the severe cases of pyelitis of pregnancy where the temperature reaches 105° F. or 106° F. it is well to leave the catheter and irrigate frequently until the temperature subsides. I rarely leave a catheter more than once. Each time you treat you dilate a little more and you don't have to leave permanent drainage. I think the pressure of the fetus in some of these cases is undoubtedly a deciding factor. I do not think they are all stricture cases. I think Herman is right in criticizing me for reporting that last case as a stricture until we have a microscopic slide. Thus far in all the cases in which we have been able to get a pathologic specimen we have demonstrated an inflammatory lesion.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

New Books

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S., DENVER, COLORADO

THE number of titles requiring review has become so large that the reader, just as happened to the reviewer, may feel somewhat bewildered. The postwar lull in medical book publishing appears to have passed.

A good illustration of how the times have changed is afforded by a volume of biography. *A Woman's Quest*[1] is more than the life history of Marie E. Zakreweska. It pictures the struggle for equal opportunity by women desirous of entering the medical profession. This indomitable woman emigrated to the United States after having obtained the position of chief accoucheuse at the Charité in Berlin, received her medical degree in Cleveland, at what is now Western Reserve University and eventually, after much hardship founded the New England Hospital for Women and Children. Her life is full of self-sacrifice, devotion and accomplishment. The book resembles a fascinating novel.

OBSTETRICS

A number of interesting books dealing with various phases of pregnancy have appeared. Obstetricians now fully recognize that gestation influences the entire organism of the mother. They therefore show an increased desire for teamwork with other specialists. The two books next to be discussed make this evident, one dealing with many of the changes encountered in gravidity, the other limiting itself to the important problem of eclampsia.

Hüssy,[2] with the collaboration of six others, has reviewed the relation of pregnancy to the various organ systems and also dealt with the biologic problems involved. The material covered is huge, necessarily entailing condensation and brevity. Problems of heredity, the influence of pregnancy on normal organs, nidation and placentation, toxicoses of pregnancy, internal diseases, psychoses, surgical diseases, diseases of the special senses, are some of the topics discussed. The monograph is interesting and suggestive, but too sketchy to be valued as a book of reference.

[1]**A Woman's Quest.** The life of Marie E. Zakrzewska, M.D. Edited by Agnes C. Vietor, M.D. D. Appleton and Co., New York, 1924.

[2]**Die Schwangerschaft.** In ihren Beziehungen zu den andern Gebieten der Medizin und ihre biologischen Probleme, von Paul Hüssy. Unter Mitwirkung von Chefarzt E. Bircher, Chefarzt Dr. O. Knüsel, Prosektor P. D. Dr. F. von Werdt, Kreisarzt F. Zollinger, E. Forster, Direktor W. Jost. Mit 8 teils farbigen Textabbildungen und 18 Kurven, Ferdinand Enke in Stuttgart, 1923.

Recognizing that deductive methods have lamentably failed in clearing the etiology of eclampsia, Hinselmann[3] has turned to inductive methods. As the problem involves almost every organ of the body he has enlisted specialists in many branches of medicine. The result of his editorial labors are this large volume containing some twelve monographs each dealing with one phase of the subject, the primary object being to record all hitherto available evidence. In spite of the size of the volume the editor admits that the treatment is far from complete or exhaustive. The pathologic anatomy has been limited to the brain, liver, kidney, placenta and fundus of the eye. He regrets that the heart, endocrine glands and other important organs, as well as metabolism could not be included, because our knowledge of their deviations from the normal in eclampsia are too little understood. Hyperplasia in the endothelium of the smaller cerebral vessels, according to Sioli, is not limited to eclampsia and cannot be used in elucidating the problem. It is tentatively suggested that the over-irritability of the vasomotor center may result from overburdening of the circulatory system. A "toxic" origin is perhaps indicated by location in the glomeruli of the kidney (cell hyperplasia). The generalization arrived at is that eclampsia occurs in gravidae whose circulatory system is hypoplastic (minderwertig) and in whom pregnancy is accompanied by special toxic factors. No further new or definite conclusions are permissible in the present state of our knowledge. Stroganoff, in a short appendix, details his method of treatment by which he has reduced the maternal death rate to 1.7 per cent in 236 cases. De Snoo describes four cases treated with salt-free diet.

The second edition of Köhler's book[4] describes the treatment of puerperal infections especially as practiced in Halban's clinic in Vienna. The interior of the infected uterus is not tampered with, except when unavoidable, because of profuse hemorrhage. Hysterectomy is limited to necrotic myomata and uterine perforation. Diffuse puerperal peritonitis, unless the patient is moribund, is treated with incision, breaking up of adhesions, drainage, without irrigation. The operation must be performed early. Among one hundred and forty-two cases thus treated the mortality was 83.81 per cent. Ligation of the pelvic veins is of doubtful value. Much space is devoted to foreign protein injection and the various substances available for chemotherapy. Nothing approaching the contents of this monograph exists in the English language. Mosby and Company have, therefore, undertaken to publish a translation of this work of Köhler's.

Hofstätter is the author of a pamphlet, dealing with pseudocyesis.[5] He says that the condition is noted in the absence of both hysteria and psychosis. Several cases, due to various causes, are quoted. A short chapter is devoted to deliberate attempts to deceive by pretending pregnancy.

Turning now to a volume which covers the entire field, DeLee's

[3]**Die Eklampsie.** Herausgegeben von Hans Hinselmann, (with twelve collaborators). Mit 13 Tafeln und 52 Abbildungen im Text, Verlag von Friedrich Cohen in Bonn, 1924.

[4]**Die Therapie des Wochenbettfiebers.** Von Robert Köhler, Em. Assistenten der gynäkologischen Abteilung Krankenhaus Wieden. Zweite Vermehrte und Verbesserte Auflage, mit 27 Abbildungen im Texte, Franz Deuticke, Leipzig-Wien, 1924.

[5]**Ueber eingebildete Schwangerschaften.** By R. Hofstätter, Wien, Urban and Schwarzenberg, Berlin-Wien, 1924.

Obstetrics[6] in my opinion is one of the two best obstetric textbooks accessible to the English reading medical public. The fourth edition shows careful revision, even in its introductory chapters, which in so many textbook revisions are subjected to neglect.

The keynote of the book is contained in the advice to the general practitioner to observe extreme conservatism, more radical measures being relegated to the hands of the hospital specialists. Unfortunately, I fear, this wholesome advice is often nullified by the fact that too few of us possess the sharp self-criticism necessary to gauge our limitations. Commendation is especially called for on "the husband" as a cause of obstetric complications, a subject which bears more extended discussion; the dictum "that attention to the child during the second stage of labor will result in a greater total saving of life than the application of all the newer methods of operative delivery," a sermon contained in a single sentence, and the conservative treatment of septic abortion.

The routine exhibition of morphine and scopolamin in the first stage of normal labor, the indications for intervention in eclampsia, episiotomy as a part of normal labor do not appeal to me.

DeLee's book is most complete, yet it remains concise, clear and readable. The volume is beautifully illustrated.

Maternity Nursing in a Nutshell, by Elizabeth H. Wickham, R.N.,[7] is a concise little book for the nurse's handbag. It contains much information, well expressed and without frills, including the "nurse's delivery" if the baby's arrival antedates that of the obstetrician.

GYNECOLOGY

Gynecology is well represented by a number of books which embrace the entire field or limit themselves to special subjects. The hugeness of the work edited by Halban and Seitz, *Biology and Pathology of Women*[8] is now becoming apparent. Volumes I and II (in 7 installments) are nearly completed, the first containing approximately 1000 pages, the second 898, and, of volume III, more than 700 pages have appeared in print. There are to be eight volumes in all.

Some of the most striking articles deal with the comparative anatomy (Schmaltz) and physiology of the domestic mammals (Keller), including the horse, cow, pig, sheep, goat, dog and cat, and also with the laboratory animals *par excellence*, the rabbit, guinea pig, rat and mouse (Drahn).

Human physiology is discussed *in extenso* by the veteran Ludwig Fraenkel, whose pioneer work on the corpus luteum is well known. An interesting chapter on anthropology is contributed by Stratz; one on heredity and eugenics by Lenz. A large amount of space is devoted to physical methods (Guthmann), shorter articles dealing with hydrotherapy (Laqueur) and psychotherapy (Walthard) being added.

[6]**Principles and Practice of Obstetrics.** By Joseph B. DeLee, A.M., M.D., Professor of Obstetrics at the Northwestern University Medical School. Obstetrician to the Chicago Lying-in Hospital and Dispensary, and to Mercy Hospital, etc. With 1128 illustrations on 923 figures, 201 of them in colors. Fourth edition, thoroughly revised. W. B. Saunders Company, Philadelphia, 1924.

[7]**Maternity Nursing in A Nutshell.** By E. H. Wickham, R. N. Former Supervisor of the Maternity Department, Lebanon Hospital, New York City; late Field Nurse, Maternity Center Association, New York City, 28 illustrations, F. A. Davis, Philadelphia, 1924.

[8]**Biologie und Therapie des Weibes.** Herausgegeben von Josef Halban. Wien, und Ludwig Seitz, Frankfurt a. M. Lieferungen 4, 5, 6, 7, 8 and 9. Urban und Schwarzenberg, Berlin und Wien, 1924.

The Endocrines, written by Aschner, who has done much work in this field, covers this confused subject as well as can be hoped for. A chapter dealing with gynecologic ailments due to industrial conditions, by Max Hirsch is most welcome. Kermauner has written an excellent exposition on malformations. Reifferscheid deals with displacements. The description of operative technics on this subject leaves much to be desired. Nürnberger has contributed a long article dealing with the problem of sterility; Pankow with the subject of arti- ,al sterilization. Schroeder completes the last installment with the pathology of menstruation.

The entire work is a monument of industry and is replete with information. It must, however, be considered an exposition of German speaking gynecology and obstetrics, because the world's literature is quite inadequately dealt with. Once more let me warn the editors that a very detailed author's and subject index is indispensable in order to make the contents readily accessible.

This is the second edition of Skeel's Manual of Gynecology.[9] The author has recognized the necessity of condensation from the medical student's point of view and, therefore, has confined his text to a smaller compass than is usual. Excellent references to the important literature encourage outside reading. Perhaps too much space is devoted to operative technic, and illustrations of operations abound.

Jellet's gynecology[10] is short, concise and well balanced. There is a marked discrepancy, however, between the recording of all the newer aequirements in our specialty (which are well presented) and the influence on therapy, which remains behind the times in many ways, as for example, curettage and formalin disinfection of the uterus for "endometritis"; dilatation with sea tangle tents; formalin 40 per cent in the infected puerperal uterus, etc. Many excellent, original illustrations adorn the text, but interspersed with them are highly colored, often meaningless, plates from Jolly's atlas.

Runge has written a short gynecology for the practicing physician[11] in the form of case histories with questions and answers. One hundred and sixty-three cases are discussed. Much attention is paid to nonoperative treatment.

The next three volumes deal with special phases of gynecology. Reynolds and Macomber's[12] readable little treatise on fertility and sterility contains much of interest. Involuntary sterility occurs in 10 per cent of marriages. Among ovarian disturbances, cystic ovaries and persistent corpora lutea are placed at the head. Infantilism, infection and dyspareunia are emphasized. An entire section written by E. L. Young, Jr., deals with the determining causes of sterility in the male. The most important chapters treat of "relative infertility"

[9]**Gynecology and Pelvic Surgery.** By Roland E. Skeel, M.D., A.M., M.S. Formerly Associate Clinical Professor of Gynecology, Medical School of Western Reserve University, Fellow of American Association of Obstetricians, etc. Second edition with 281 illustrations, P. Blakiston's Son and Co., Philadelphia, 1924.

[10]**A Short Practice of Gynecology.** By Henry Jellett, M.D., (Dublin University) F.R.C.P.I. Consulting Gynecologist, late Master Rotunda Hospital, Dublin; Extern Examiner in Midwifery and Gynecology, University of New Zealand; etc. Fifth edition, 318 illustrations, 10 colored plates, J. and A. Churchill, London, 1924.

[11]**Die Gynaekologie des Praktischen Arztes.** By Ernst Runge, Dirigierender Arzt des Wöchnerinnenheims am Urban zu Berlin (Entbindungsanstalt und Frauenklinik) Mit 60 Abbildungen im Text, Verlag von Urban und Schwarzenberg, Berlin-Wien, 1924.

[12]**Fertility and Sterility in Human Marriages.** By Edward Reynolds, M.D. and Donald Macomber, Boston. With a section on the *Determining Causes of Male Sterility* by Edward L. Young, Jr., M.D., Boston. Illustrated. W. B. Saunders Company, Philadelphia, 1924.

of the partners due to depressing conditions (diet). Poor spermatozoa, local uterine conditions making nidation precarious, and trauma, produce habitual abortion. Mistakes in marital habit are a frequent cause of sterility. The care of the young girl at puberty and during menstruation is prophylactically important. The final chapters deal with "the clinical conduct of the case."

The fourth edition of Bandler's well-known *Medical Gynecology*[13] requires no extensive review. As heretofore, several collaborators have aided with special chapters. Among them are Dannreuther, Mannheimer and Highman. It is well that occasionally a book appears which emphasizes and instructs in the nonoperative side of gynecology, a phase of our specialty in which our younger colleagues are often sadly ignorant. Most of the subjects are adequately treated. Few pathologists will agree with Dannreuther in accepting Heitzmann's criteria in the diagnosis of the site of origin of epithelial cells found in the urine. Bandler might well omit description of both intrauterine atmocausis and galvanic application; on the other hand a description of diathermy would be useful. Redrawing of Fig. 43 with the cystoscope window pointing downward would be an improvement. As heretofore, Bandler's ideas on the endocrines must appear fanciful to the conservatives.

Pestalozza's[14] short monograph on genital tuberculosis, well illustrated and containing numerous case histories, states that the frequency of this localization can best be prevented by prophylaxis, care being taken to safeguard children. In every case of genital tuberculosis medical measures (iodine, serotherapy, vaccinotherapy, heliotherapy and radiotherapy) are indicated. Only when such treatment fails is exploratory laparotomy advised. The mortality of salpingectomy is 2 per cent, of the radical operation 10 per cent.

Gynecology and *Obstetrics*, volume V of the *Practical Medical Series*,[15] is most useful for those who like to obtain their information in highly concentrated form. The editorial comments by Watkins, De Lee and Greenhill are terse and illuminating.

RADIOTHERAPY

The intimate relationship of radiotherapy to our specialty is emphasized by the five books next reviewed.

The radium report of the Memorial Hospital in New York[16] is a most interesting document. More than half of the papers have already appeared in various journals. Of the original papers I may refer to the results obtained in lip cancers of which 69.6 per cent remained well over eighteen months, and in skin epitheliomas of which 95 per cent regressed clinically. Tongue and tonsil growths give good results, while rectal cancer has a poor outcome, quite similar to the results

[13]**Medical Gynecology.** By Samuel Wyllis Bandler, M.D., Fellow of the American Association of Obstetricians and Gynecologists; Professor of Gynecology, New York Post-Graduate Medical School and Hospital, etc. Fourth Edition. With original illustrations. W. B. Saunders Company, Philadelphia, 1924.

[14]**La Tubercolosi Genitale Nella Donna.** By Prof. Ernesto Pestalozza, Direttore della Clinica ostetrico-ginecologica della R. Universita di Roma. Libreria Di Scienze E. Lettere, Roma, 19-20 1924.

[15]**The Practical Medicine Series.** Volume v, *Gynecology*, Edited by Thomas J. Watkins, M.D., F.A.C.S., *Obstetrics*, Edited by Joseph B. De Lee, A.M., M.D., with the Collaboration of J. P. Greenhill, B.S., M.D., The Year Book Publishers, Chicago, Series 1923.

[16]**Radium Report of the Memorial Hospital.** New York, (Second Series, 1923), Octavo, 305 pages, 55 illustrations; Paul B. Hoeber, Inc., New York City, 1923.

obtained by surgery. Six hundred cases of uterine carcinoma have been treated, the results since 1918 showing distinct improvement. In primary cancer of the breast, surgery and radiation are indicated. Far advanced cases of malignancy are rendered worse by radiation. The report proves that radiotherapy is an important new development which promises further advance.

Wintz has written two important monographs dealing with the technic of roentgen treatment of cancer of the uterus[17] and of cancer of the breast.[18]

For uterine cancer 100-110 per cent S.E.D. is essential to kill the cancer cells. The further course depends on biologic factors (resistance, etc.). Eighty per cent of cases show local healing; in fifteen per cent an ulcer persists; in a few a pelvic phlegmon develops. The treatment of five to five and one-half hours of exposure must be given within two to two and one-half days, using six or seven ports of entry. A white blood count below 2500, as well as hemoglobin percentage below forty to thirty absolutely contraindicates raying. By means of diaphoresis, copper is deposited in the tumor before exposure. Excellent illustrations explain the text.

Mammary cancer,[18] on the other hand, is a debatable field. Wintz describes his own technic, after pointing out that the large area, the shallow depth, the impossibility of employing cross fire complicate the treatment. He also rays the ovaries. The numerous photographs elucidate his description. These two monographs form a valuable addition to our technical library.

Holzknecht[19] reviews the most modern achievements of deep x-ray therapy in nine lectures, of which five have previously appeared in print. He is a believer in repeated moderate dosage even in the treatment of cancer. In cancer he does not believe that there is a stimulating dose.

A short, nontechnical pamphlet by Martius[20] contains a description of the x-ray apparatus used by the modern radiologist.

ENDOCRINOLOGY

Another special field which has aroused great, at times too great, enthusiasm among gynecologists is that of endocrinology. The first two books to be mentioned are conceived in a laudably objective vein. Aschner[21] has devoted an entire volume of five hundred pages, not to women's diseases but the "sick woman." Habitus, general constitutional diseases and dyscrasias are discussed. Individuals are classified into types, a method unconsciously employed by every good clinician who bases his therapeutics upon the individual as well as upon the disease to be dealt with.

[17]**Die Roentgenbehandlung des Uteruskarzinoms.** By Hermann Wintz O. Professor, Direktor der Universitäts-Frauenklinik Erlangen, 50 Lichtdrucktafeln, Georg Thieme, Leipzig, 1924.

[18]**Die Roentgenbehandlung des Mammakarzinoms.** By Hermann Wintz, O. Professor, Direktor der Universitäts-Frauenklinik Erlangen, 4 Abbildungen und 82 Lichtdrucktafeln, Georg Thieme, Leipzig, 1924.

[19]**Roentgentherapie.** Neun Vortraege von G. Holzknecht. Professor an der Wiener Universitaet, etc. etc. Urban und Schwarzenberg, Berlin, 1924.

[20]**Handbuch der Gesamten Medizinischen Anwendungen der Elektrizitaet,** einschliesslich der Röntgenlehre, in drei Bänden. By Heinrich Martius, Band III, Lieferung 1: 51 Abbildungen im Text, Werner Klinkhardt, Leipzig, 1922.

[21]**Die Konstitution des Weibes.** Von Dr. Bernhard Aschner, Privatdozent an der Universitaet Wien. Erster Band. Allgemeine Konstitutionslehre. Verlag J. F. Bergmann, Muenchen, 1924.

The main contents is divided into: basis of constitution (sex, complexion, temperament, tonus, dimensions, etc.), theory, constitutional anomalies and diseases (asthenia and enteroptosis, infantilism, etc.), endocrine diseases, diseases of the hematopoietic and lymphatic systems, disturbances of metabolism and nerves, neoplasms and malformations. The book is an earnest and scholarly contribution to one of the newest and least understood phases of modern medicine. Many of the opinions will, doubtless, require modification but no one can read this book without deriving stimulation and profit from its pages.

Zondek[22] has written a very acceptable book dealing with the clinical manifestations of endocrine disease. He places the endocrine (chemical) system on a par with the nervous system. Eighteen complexes are graphically described, of which four are due to thyroid and five to pituitary disturbances. Much attention has been devoted to metabolic changes. Osteomalacia is included as a disease of the internal secretory organs. Many excellent photographs of rare and interesting cases are reproduced.

Dercum's *Biology of the Internal Secretions*[23] is an interesting generalization, well written, showing much thought and knowledge, but is based largely on a hypothetical foundation. The "all important function of the thymus" has yet to be established. The chapters on the endocrine factor in nervous and mental diseases are interesting. The explanation offered for the cause of malignancy resembles somewhat the "Entdifferentzierung" of v. Hansemann and has no direct bearing on the internal secretions. The book is well worth reading, with mental reservations on the soundness of its speculation.

Timme's *Lectures on Endocrinology*[24] consist of an unaltered reprint of an article appearing in 1921. It is typical of the "clinical" endocrinology current today, which owes its birth to lack of patience in waiting for facts, and in the interim bolsters the gaps with plausible hypotheses. We instance the statements that the thymus secretes a substance which has vagotonic properties, that pineal subinvolution and precocious pineal involution produce syndromes, all of which are purely hypothetic conclusions.

MISCELLANEOUS

A number of books will now be discussed which, though not strictly belonging to our field, are important, instructive or interesting to every physician who desires to keep abreast of the advance in knowledge. The second edition of Cabot's *Modern Urology*[25] is of much interest to the gynecologist. The treatment of bladder, ureteral and kidney conditions is in many ways identical in the two sexes. Lesions of the external genitalia dealt with, which interest us, include syphilis, chancroid and inguinal granuloma. We disagree with Corbus who

[22]**Die Krankheiten der Endokrinen Druesen.** Ein Lehrbuch für Studierende und Aertzte. Von Herman Zondek, 173 illustrations, Berlin, Julius Springer, 1923.

[23]**The Biology of the Internal Secretions.** By Francis X. Dercum, M.D., Ph.D. Professor of Nervous and Mental Diseases in the Jefferson Medical College; Member of the American Philosophical Society; Member of the Academy of Natural Sciences of Philadelphia. W. B. Saunders Company, Philadelphia and London, 1924.

[24]**Lectures on Endocrinology.** By Walter Timme, M.D., Attending Neurologist, Neurological Institute, New York. Paul B. Hoeber, New York, 1924.

[25]**Modern Urology.** By Hugh Cabot, M.D., C.M.G., F.A.C.S., Dean and Professor of Surgery in the Medical School of the University of Michigan, Ann Arbor, Michigan, Second Edition, thoroughly revised; illustrated with 398 engravings and 11 plates, Lea and Febiger, Philadelphia and New York, 1924. vols. 1 and 2.

classifies all cases of esthiomene under syphiloma vulvae. That dyspareunia is not infrequently due to tender ureters according to Hunner, is worth keeping in mind, but probably not as frequent as this author implies. Vesicovaginal fistula appears to have been overlooked.

This American textbook is of as much value to the gynecologist as to the genitourinary specialist for whom it was primarily intended. The smooth and continuous text, from twenty-seven well-known contributors, gives evidence of careful editorial supervision.

Mummery's[26] is a personal book giving an exposition of the author's own viewpoint and experience. To me the subjective element adds to its value as it is based on more than twenty years of experience. The present volume represents a combination of two previous monographs, one dealing with the rectum, the other with the colon. The author uses spinal, regional or local anesthesia combined with nitrous oxide-oxygen sequence or with twilight sleep. He devotes much attention to the commoner conditions such as colitis, hemorrhoids, fissure and fistula. In the latter disease Mummery does not practice division of the sphincter ani routinely. Diverticulitis is a fatal ailment showing a mortality of 70 per cent. His judgment of colonic stasis is commendably conservative. The author appears to consider recto- and sigmoidopexies valuable in prolapse. The book is excellent.

For the specialist interested in possessing a very complete reference guide on anesthesia the second edition of Gwathmey's treatise[27] will be welcome. It covers every detail including the history, physiology and chemistry of anesthetics. The special technics and the indications for choosing a given anesthetic are fully discussed. Local anesthesia, spinal analgesia and anesthesia, intravenous, synergist (including magnesium sulphate and painless childbirth) anesthesia, the new ethylene, medicolegal aspects are some of the main subjects dealt with in a clear and adequate fashion.

Designed for a larger circle of readers, Webster[28] has published a short manual for the medical student and physician in general practice, in other words, for the occasional anesthetist. The ground is completely covered, including the newest anesthetic, ethylene, and the special field of local anesthesia.

Barker's translation of Siemen's scholarly book on race hygiene and heredity[29] is well worth reading. A simple, clear-cut review of the teachings of Lamarck, Darwin, Vilmorin, Weissman, Mendel, etc., is presented. The part played by selection and variation is shown. Inbreeding often elevates. The decay of ancient civilizations was due to lack of care in maintaining sufficient fertility among the capable. The racial hygiene of today should consist in an attempt to arrest the

[26]**Diseases of the Rectum and Colon** and their Surgical Treatment. By P. Lockhart-Mummery, F.R.C.S. Eng. M.A., M.B., B. C.Cantab, Senior Surgeon to St. Mark's Hospital for Cancer, Fistula, and other Diseases of the Rectum, etc., William Wood and Company, New York, 1923.

[27]**Anesthesia.** By James Tayloe Gwathmey, anesthetist to New York, Cancer, and Peoples' Hospitals, etc. With collaboration on special subjects. Illustrated. Second revised edition. The Macmillan Co. New York, 1924.

[28]**The Science and Art or Anesthesia.** By Colonel William Webster, D.S.O., M.D., C.M., Professor of Anesthesiology, University of Manitoba Medical School; Chief Anesthetist, Winnipeg General Hospital; Illustrated, C. V. Mosby Company, St. Louis, 1924.

[29]**Race Hygiene and Heredity.** By Hermann W. Siemens, M.D. Translated and edited by Lewellys F. Barker, M.D., Illustrated. D. Appleton and Company, New York, 1924.

dying out of the socially higher classes by restricting undesirable emigration, by selective taxation, enlightenment, etc.

The first edition of Tandler's topographic anatomy of emergency operations[30] was published for the benefit of military surgeons during the World War. The present edition covers the entire human body except the female genital organs. In ten lectures he deals with the surgery of the heart and great vessels, the respiratory apparatus, digestive tract and urogenital system. Superb, yet simple drawings in color, based on fine dissections, lend to this small volume the value of an atlas.

Two monographs from the *Bibliothèque du Cancer* interest the gynecologist greatly. Okinczyc[31] described cancer of the intestine. The literature, beyond the year 1921, does not appear to have been utilized, except in the very complete section on operative technic.

The second monograph is that of Lecène and Wolfromm on cancer of the kidney, suprarenal capsule, upper urinary tract and solid paranephritic tumors.[32] Both volumes are well got up and nicely illustrated.

The third edition of Roussy and Bertrand's epitomé of pathologic histology[33] has just appeared. The second edition was translated into English by MacFarland. Originally designed as a quiz compend, the sterling worth of the book has given it a unique position. Compressed into fourteen lectures, one page of text with a corresponding high and low power illustration on the opposite page, the entire body, including the endocrine glands, has been covered in the small compass of 259 pages. This is a wonderful little book of equal value to student and teacher.

The seventh and eighth edition of Kaufmann's textbook of pathology[34] has again brought this classic up to date. For many reasons Kaufmann's pathology has always appeared to me the most useful and instructive of its kind. For years I have always kept it at my elbow, and almost never has it failed me as a book of reference. The immense amount of information compressed within its 1,962 pages is difficult to realize. Although written largely in the form of an epitome the text is most readable. The viewpoint of the clinician is always kept in mind. Differential diagnosis, both gross and microscopic is emphasized. Brief interpolations in the literary references epitomize the gist of long articles in a single sentence. Even the short legends accompanying the illustrations are exceptionally instructive. The two hundred pages devoted to gynecologic, obstetric and mammary conditions cover this field most adequately. This book should, long since, have been translated into the English language.

[30]**Topographische Anatomie Dringlicher Operationen.** By J. Tandler, O. ö. Professor der Anatomie an der Universität Wien, Zweite, Verbesserte Auflage mit 56 zum grossen Teil farbigen Abbildungen im Text, Verlag von Julius Springer, Berlin, 1923.

[31]**Bibliotheque du Cancer de L'Intestin..** By J. Okinczyc. Professeur agrégè à la Faculté de Medecine de Paris, Chirurgien des Hopitaux, 78 figures dans le texte. Gaston Doin, Paris, 1923.

[32]**Bibliotheque du Cancer, Cancers du Rein.** By P. Lecène et G. Wolfromm, 32 figures dans le texte, Gaston Doin, Paris, 1923.

[33]**Travaux Pratiques D'Anatomie Pathologique.** Quatorze seances de lectures de coupes microscopiques. Par Gustave Roussy, et Ivan Bertrand. Préface du professeur Pierre Marie. Troisième édition. Messon et Cie. Editeurs. Paris, 1924.

[34]**Lehrbuch der Speziellen Pathologischen Anatomie,** für Studierende und Aerzte, von Eduard Kaufmann, Siebente und Achte völlig neu bearbeitete und vermehrte Auflage, Vereinigung Wissenschaftlicher Verleger. Walter De Gruyter & Co. Berlin-Leipzig, 1922. Volumes one and two.

The tenth edition of Hammarsten's standard textbook of physiologic chemistry[35] is an unaltered reprinting of the previous edition published in 1921. This book continues to be the most useful reference handbook dealing with physiologic chemistry, because of its encyclopedic completeness, careful arrangement and marginal index. It is a valuable guide to the widely scattered literature and sufficiently simple to be comprehensible to the physician who still remembers the elements of chemistry.

Hedin, Johansson and Thunberg have collaborated by writing special chapters. Hedin is the author of the introductory chapter, dealing mainly with physical chemistry, and has also covered the subject of the carbohydrates, digestion and the organs of procreation. Thunberg discusses respiration and oxidation. Johansson takes up metabolism, the rest of the volume being from the pen of the senior author.

Volume III of the surgical anatomy and pathology written by Duval, Jeanbrau, Gosset and Lecène[36] describes in detail the diseases of the breast, liver and gall bladder, spleen, pancreas, intestine, peritoneum and genital apparatus of the male. The exposition is sane and sound, the numerous illustrations are fair. No bibliography is appended. When I mention as an example that Bloodgood's work on chronic mastitis is not referred to, nor Handley's researches in mammary cancer, the English speaking reader will realize that the book offers but little appeal to him.

Otfried Müller assisted by Weiss, Niekau and Parrisius[37] has published a marvelous atlas with colored plates showing the capillaries of the human body surface in health and disease. The text enters fully into what is known of this important division of the circulatory apparatus which harbors only about 200 c.c. of blood, or only one-twenty-fifth or one-thirtieth of the blood volume, yet is of utmost importance to every cell in the organism. Technic, armamentarium and findings are described in greatest detail making of this atlas a valuable and basic contribution to the study of the circulation.

Volume two of the 1924 International Clinics[38] contains a symposium of physiotherapy. Brooke aborts coryza by vibration between seventh cervical and first dorsal vertebra. Caudal anesthesia in urology is dealt with by Haines, Mumey and Faber. Balfour and Flynn cover advances in surgery. The tide has turned somewhat against cholecystectomy in obstructive conditions of the common bile duct. Lugol's solution has relieved 37 per cent of exophthalmic goiter cases and reduces the operative mortality in those requiring surgery. Brickner describes affections of the shoulder. There are seventeen other articles dealing with a variety of topics.

[35]**Lehrbuch der Physiologischen Chemie,** Unter Mitwirkung von Prof. S. G. Hedin in Upsala, Prof. J. E. Johansson in Stockholm und Prof. T. Thunberg in Lund, Herausgegeben von Olof Hammarsten, Zehnte unveränderte Auflage, J. F. Bergmann, München, 1923.

[36]**Precis de Pathologie Chirurgicale.** Tome III. Glandes mammaires, abdomen, appareil génital de l' homme. Par Pierre Duval, E. Jeanbrau, A. Gosset, P. Lecene et Ch. Lenormant. Quatrième édition. Masson et Cie. Editeurs, Paris, 1924.

[37]**Die Kapillaren der Menschlichen Koerperoberflaeche,** in Gesunden und Kranken Tagen, In Gemeinschaft mit den Privatdozenten und Assistenzärzten der Klinik Herren Dr. Eugen Weis (z. Z. Regierungsmedizinalrat und leitender Arzt am Versorgungskrankenhaus in Heilbronn), Bruno Niekau und Walter Parrisius, dargestellt von Professor Otfried Müller, mit 187 farbigen Abbildungen auf 20 Tafeln und 28 Textabbildungen, Ferdinand Enke, Stuttgart, 1922.

[38]**International Clinics.** A Quarterly of illustrated clinical lectures and especially prepared original articles. Edited by Henry W. Cattell, A.M., M.D., Philadelphia. Volume II. Thirty-fourth Series, 1924. J. B. Lippincott Co., Philadelphia, 1924.

Hofstätter devotes an entire volume to the *Woman Who Smokes*.[39] He considers the habit one manifestation of epicurean sensuality due to the desire to overcome depression, a form of narcotomania akin to alcoholism, morphinism and the cocain habit. "The cigarette is an awful temptress for our young people; it leads the way to all depravity." Those interested may read this medical tract.

Four additional booklets, published under the auspices of the National Health Series, have reached me. Their titles are: *Your Mind and You*, by George K. Pratt, M.D.; *Adolescence*, by Maurice A. Bigelow, Ph.D.; *Health of the Worker*, by Lee K. Frankel, Ph.D.; *Exercises for Health*, by Lenna L. Meanes, M.D. Like the preceding fourteen volumes these are written by well-recognized authorities on the four different fields touched upon.

Selected Abstracts

Birth Injuries of the Newborn

Holland: **Cranial Stress in the Fetus During Labor and on the Effects of Excessive Stress on the Intracranial Contents.** Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxix, 531.

Holland found tears in the dura mater septa in 81 out of 167 fetuses dying during labor. A small percentage of the injuries occurred in normal labors. Thirty-five of the eighty-one were either breech or version cases. Bilateral lacerations of the tentorium cerebelli occurred sixty-four times.

During labor the fetal head is subjected to a cranial stress composed of both general and simple longitudinal compression. The latter is the most important in its effects on the cranium and intracranial contents. Excessive stress results in excessive moulding, over-stretching and tearing of the tentorium and falx cerebri and in the rupture of certain blood vessels. The attachments of the septa of the dura mater tend to limit and prevent excessive moulding. When tears of the septa occur the most common site is in the falx cerebelli near its junction with the falx cerebri. Due to its fixed attachment, changes in the septa are frequently transmitted to the vein of Galen, resulting usually in rupture of one of its tributaries and subdural hemorrhage. Subdural hemorrhage of greater or less degree was found in all but six of the author's eighty-one cases. Due to the increase in the anteroposterior diameter of the fetal head, lacerations of the falx cerebri are common in brow and face presentations. The high percentage of cerebral hemorrhage and tentorial lacerations seen following complicated breech labors results from the rapid compression of the aftercoming head.

The location of a cerebral hemorrhage is usually more important than its size. A small hemorrhage confined beneath the tentorium is frequently more serious than a larger one above. Actual tears of the tentorium are not in themselves a cause of death. In the absence of severe hemorrhage there is no doubt that many infants survive the original strain and grow up none the worse for lacerations of the tentorium. While forceps delivery saves many babies, the

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[39] **Die Rauchende Frau.** Eine klinische, psychologische und soziale Studie. Von Dr. R. Hofstaetter, Privatdozent fuer Geburtshilfe und Gynaekologie in Wien. Verlag von Hoelder-Pichler—Tempsky. Wien—Leipzig, 1924.

injudicious use of instruments is the cause of many needless fetal deaths. Twenty-five of forty-four vertex cases with fatal lacerations of the tentorium were delivered by forceps. H. W. SHUTTER.

Capon: ' Intracranial Traumata in the Newborn. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxix, 572.

The important factors in safeguarding the life of the fetus during labor are: The mobility of the bones of the cranial vault, the presence of membranous fontanelles and sutures, and the low excitability of the fetal respiratory center preventing premature respiration. Prematurity and a tendency to hemorrhage predispose to intracranial injury. Excessive moulding, particularly when rapid, is the most common direct cause of such traumata. Intracranial congestion, edema, increased tension and hemorrhage may occur in normal labor and almost always accompany contusions and lacerations of the dural septa when excessive moulding has occurred. When increased intracranial pressure is produced the accompanying depression of the respiratory center frequently makes artificial stimulation of little avail after birth. Venous congestion of the fetal brain and meninges produced in a normal labor may be equally as serious as the larger subdural hemorrhages. Intracranial hemorrhage usually occurs either from the small tentorial vessels, the vein of Galen or the cerebral veins near their termination in the superior longitudinal sinus. Hemorrhage of the internal cerebral veins and sinuses is rare.

The diagnosis of intracranial injury rests on the history and the external evidence of cranial stress, such as scalp injuries, caput succedaneum, excessive moulding, fractures and depressions, bluish asphyxia and nervous symptoms. The disinclination to nurse, shallow respiration, slow, full pulse are symptoms frequently present. The nervous symptoms are central when the hemorrhage is above the tentorium and are of value when a localized hematoma is present. Yawning, sighing, nystagmus, muscle spasm and ocular palsies may be present. Convulsions usually signify a hemorrhage of cortical origin. The bulging fontanelle may be either an early or late finding. Convulsions, Cheyne-Stokes' respirations and the loss of reflexes are usually late symptoms. Cyanosis, twitchings, convulsions and bulging of the anterior fontanelle carry a bad prognosis which, however, improves after the fifth day. Paralysis and pathologic mental states are not uncommon sequelae in cases recovering.

Early lumbar puncture is indicated in all suspected cases and is apparently without danger. It is most efficacious when convulsions coexist or when the cerebral lesion is only due to congestion. The fluid withdrawn early resembles whole blood, later it clarifies. In the treatment of these injuries rest and the maintenance of body temperature and nutrition is important. Human and horse serum help to control further hemorrhage. Since hemorrhage occurring during labor is more frequently diffused than local, surgical intervention seems contraindicated in the majority of cases. H. W. SHUTTER.

Cameron: Intracranial Birth Injuries. Lancet, 1923, ccv, 1292.

The immediate symptoms of large subdural hematoma, above or below the tentorium or in both situations, are fairly definite. Tense bulging of the fontanelle is clear evidence of increased intracranial tension. Pressure upon the fontanelle in such cases produces respiratory distress, screaming or even convulsions. The cerebrospinal fluid is often under increased pressure, and in most cases contains blood. About sixty per cent of the cases show retinal hemorrhages and at times,

edema of the disc. Inequality of the pupils, squinting and nystagmus are common. Extreme restlessness, constant screaming or sometimes stupor and immobility are exhibited. The increased tone of the muscles is very striking in most cases. Impairment of the sucking and breathing reflexes indicate most clearly the seriousness of the condition. Suction may not only be poor and clumsy but the reflex may be entirely absent.

Many of these conditions are overlooked during early infancy. It is only when the hemorrhage has affected those vital medullary reflexes which are active from the first that the child is brought for examination early.

These cases may be inaccurately classed as mental inferiors. A close observation, however, will often afford convincing proof of the activity of the brain in spite of the expressionless face and immobile helpless limbs. Memory, artistic perception, esthetic sense, imagination and character may all be on a high plane. At the worst, personality is not debased as in primary mental defects. The idiot is known by what it does, these children only by what they cannot do.

NORMAN F. MILLER.

Ballance and Ballance: Intracranial Hemorrhage in the Newborn. Lancet, 1922, cciii, 1109.

The authors report a case of intracranial hemorrhage in the newborn as a preface to some general observation on fractures of the skull of infants.

Labor was slow and prolonged. The delivery was effected by forceps but with difficulty. The child was born in a state of asphyxia. During the first two days the child was continually crying. On the third day a long screaming fit occurred, and, following this, an enlongated soft swelling was observed on the right side of the head. On the fourteenth day the child was operated upon and about two ounces of dark blood removed, and a broken fragment of the frontal bone exposed and removed. The baby made a good recovery.

Prompt operation is advocated, not only to obviate impending death, but also in case of recovery to anticipate and prevent paralysis, amentia, epilepsy, etc.

The various types of fractures are mentioned and illustrated by appropriate case reports from literature.

The writers believe that infants bear operations well, if carried out with the greatest gentleness and with every effort to prevent the loss of blood.

NORMAN F. MILLER.

Ehrenfest, H.: The Causation of Intracranial Hemorrhages in the Newborn. American Journal of Diseases of Children, 1923, xxvi, 503.

An understanding of the causation of intracranial birth hemorrhages, while important for diagnosis and treatment, is essential for the far more urgent problem of their prevention. The question of prophylaxis concerns most of all the obstetrician. It seems that obstetricians have succeeded in revealing the exact mechanism of the origin of these injuries.

Compression of the head in any one direction results in the shortening of the diameter lying in the direction of the pressure, and a compensatory lengthening of the diameter perpendicular to the one reduced. The longitudinal arrangement of the fibers in the falx and their lateral extension on either side into the tentorium indicates that it is the chief mechanical task of the falx to prevent an abnormal extension of the long diameters of the cranium, and thus to counteract during moulding the effect of lateral compression. But sudden or excessive compression in either lateral or longitudinal direction, by raising the falx, may cause

fibers to tear at the point where the falx fibers diverge to form the upper blade of the tentorium. The effect of the tear on the infant in the main is determined by the hemorrhage resulting from it. Hemorrhage and size of hematoma therefore depend on whether any vessels are torn and whether they are small or large. Asphyxiation enters into the problem of the etiology of these hemorrhages, solely as a predisposing or contributory but never as a direct cause, only in so far as an engorged vessel is more likely to tear and to discharge a larger amount of blood. Here also enters still another etiologic factor, again solely as contributory but not as direct cause, namely hemorrhagic diathesis. In the presence of this condition even a very small vessel gradually will permit the escape of a dangerously large amount of blood.

We have in the causation of intracranial hemorrhages to differentiate between the direct mechanical causes and certain predisposing and contributory factors. Such a grouping does not in the least detract from its value as an aid in diagnosis and treatment but unquestionably is of greater advantage in the problem of prevention. Emphasis properly belongs to these primarily mechanical factors which cause intracranial structures to be crushed or torn, with more or less hemorrhage resulting from the injuries as determined by other factors. The frequency with which such injuries involve more than one structure (as illustrated by the writer in a few cases he describes) well accounts for the perplexing symptomatology and the futility of surgical interference in many of the cases.

GROVER LIESE.

Siegmund, H.: Birth Injuries to the Brain and Their Consequent Results. Münchener Medizinische Wochenschrift, 1923, lxx, 137.

In all birth injuries the vascular system is the one most affected as far as cerebral injuries are concerned. Mechanical injury and tearing of small vessels results in circulatory disturbance; injury to vessel walls, leads to diapedesis of red cells, impairment of nourishment and to establishing of areas of softening. The development of cysts, sclerosis, porencephaly, and even necrosis may follow in these foci of impaired circulation. Within the first six months of life especially in the premature children we may find evidence of cicatricial softening. External hydrocephalus may come from subdural bleeding while internal hydrocephalus may result from cerebral bleeding. The so-called encephalodystrophia or fatty degeneration of the neuroglia probably arises from cerebral hemorrhage, secondary to birth trauma. In many postmortem examinations of newborn children one cannot fail to be impressed with the hyperemia of brain substance and meninges, and probably many of the deaths of infants are due to small hemorrhages and a diapedesis occurring as a result of birth trauma.

A. C. WILLIAMSON.

Kelly, G. F.: Intracranial Hemorrhage in Newborn. Wisconsin Medical Journal, 1924, xxiii, 16.

The author reports two cases of intracranial hemorrhage in the newborn. The first case was a breech delivery without instrumental assistance. The head of the child was large with separated fontanelles, and it had a spina bifida in lower dorsal and lumbar regions. The child was admitted to the hospital five hours after delivery for possible surgical treatment of the spina bifida. The condition of the baby was not good during its stay in the hospital. Intracranial hemorrhage was not suspected. It died at the end of nine days. Autopsy showed subdural hemorrhage with hydrocephalus.

The second case was a baby, twenty-two days old. The labor was prolonged and very difficult with instrumental assistance and under general anesthesia. When two weeks old it developed convulsions which became general and continued for several days. There was almost constant twitching of face, arms and legs. Feeding was difficult and vomiting was frequent. The infant lived six weeks after entering hospital. Diagnosis was intracranial hemorrhage, but no autopsy was allowed.   F. J. SOUBA.

Saenger, H.: **The Origin of Intracranial Hemorrhages in the Newborn.** Monatsschrift für Geburtshilfe und Gynaekologie, 1924, lxv, 258.

The author studied 100 newborn babies upon which autopsies had been performed. Twenty-seven of these showed no macroscopic intracranial bleeding and no tentorial laceration, twenty-seven had mild cerebral hemorrhage and forty-six had extensive cerebral hemorrhage. Six of these babies had been delivered by cesarean section, but three were premature.

No mechanism of labor is as dangerous to the child as the delivery of the aftercoming head. Of twenty-three children delivered feet first that came to autopsy, only three failed to show tentorial lacerations and only one failed to show intracranial hemorrhage. If the aftercoming head is easily delivered by nature there is no damage, but if dystocia arises there are marked circulatory disturbances which are intensified by the external stimulation of the skin (cooling). Both brain and heart receive an increased blood supply. The forceps are the best means of replacing the *vis a tergo* and of preventing too great distention of the skull in a vertical direction. If instead of a forceps, strong traction is made on the body from below there results an enormous hyperemia of the head. The sinuses become filled with blood and the dural duplications, the falx cerebri and the tentorium cerebelli become enormously stretched. Traction on the neck, mouth and jaw increase the vertical diameter of the skull. Hence the dura and with it the falx cerebri suddenly tear and the laceration in the latter extends on to the tentorium. The author goes so far as to say that in every delivery by the Wiegand-Martin or Smellie-Veit maneuver if more is required than simple rotation and extraction, tentorial tears result.

Thirteen cases of this series showed hemorrhage after forceps operation. In nearly all these cases the forceps marks indicated that instead of a biparietal application an oblique or an anteroposterior application had been used. As regards intracranial hemorrhage, the Kielland forceps are the least harmful, for in all the cases where the Kielland forceps alone were used not one case of intracranial hemorrhage was found by the author. But intracranial hemorrhage undoubtedly does occur with the Kielland forceps, for hemorrhages are even found after spontaneous deliveries in normal pelves. In this series thirteen cases of hemorrhage were found after spontaneous delivery.

Of the forty-six cases of severe hemorrhage all but three showed lacerations of the tentorium. By the injection method which the author used he demonstrated that the greatest portion of the free blood came from tears in branches of the tentorial veins. These veins have no muscularis or elastic fibers. The cerebral veins, on the other hand, possess the power of contractility and so may check hemorrhage. Tears in the large internal cerebral veins lead to hemorrhages into the ventricles and such hemorrhages are found essentially in premature babies. Large hemorrhages into the brain substance itself were never found.

Thirty-four of the babies were born without any signs of life and nearly all showed mucus, meconium and vernix in the bronchi indicating premature aspiration. In twenty-four the heart was beating at the time of birth.

                                                   J. P. GREENHILL.

Sharpe: Intracranial Hemorrhage in the Newborn. Journal American Medical Association, 1923, lxxxi, 620.

Sharpe writes on the advisability of an early diagnosis of intracranial hemorrhage in the newborn and the value of treatment in the acute stage. He uses lumbar puncture both as a diagnostic and curative measure. In an examination of 100 consecutive newborn children, he found free blood in the cerebrospinal fluid in nine cases. No untoward effects on the baby were observed from the lumbar puncture. In another series of forty-eight newborn babies with a diagnosis of a serious intracranial lesion, following a very difficult labor with and without the use of instruments, lumbar puncture was performed on all but two, and free blood was obtained in the cerebrospinal fluid of 87 per cent during the first week after birth. During the second week and especially later, the lumbar puncture was less valuable as a diagnostic aid. In four of the milder cases repeated lumbar puncture was done, and in two, the condition cleared up. The operative and postmortem findings in 100 per cent of these acute extreme cases disclosed subdural, supracortical, and subarachnoid hemorrhage of varying degree. He states that lumbar puncture both as a diagnostic and as a therapeutic measure should be done in every suspected case of intracranial lesion of the newborn.

W. KERWIN.

Cruickshank: The Hemorrhages of the Newborn. The Lancet, 1923, cciv, 836.

The writer's study is based on 400 infants, 200 of which were mature and 200 premature cases.

He considers first the hemorrhagic diatheses of the newborn. These are to be distinguished from, first, the true birth hemorrhages and secondly from the hemophiliacs. The commonest manifestations of these spontaneous hemorrhages, which he groups together under the name of hemorrhagic diathesis, are bleeding from the gastrointestinal tract, bleeding into the skin, bleeding from the umbilical cord and late bleeding into the suprarenals and other viscera.

The second group considered is entirely separate from the various forms mentioned under hemorrhagic diathesis and includes prenatal, intranatal and neonatal asphyxia as well as those of intranatal traumatic origin.

In the series of 200 infants, hemorrhage of greater or lesser degree was present in 154 cases, or 77 per cent. Of this number, in fifty-five cases the hemorrhage consisted only of capillary oozing, and if these be neglected there would be a gross hemorrhage in ninety-nine cases, approximately 50 per cent of the series.

Two hundred premature infants were studied, born during the eighth to ninth lunar months of pregnancy. It was found that in 133 cases hemorrhage was present. In fifty-two of the premature infants the bleeding did not amount to more than a capillary oozing so that the gross hemorrhage in premature cases occurred in eighty-one cases, approximately 40 per cent of the whole.

It is interesting to note that the incidence of tentorial tears was practically the same in the two groups.

Where a tentorial tear occurred in a mature infant, it was found that in 79 per cent of these cases, the labor was abnormally long, while in 9 per cent it was precipitate. It was also noted that in 47 per cent of the mature cases and 52 per cent of the premature cases where this tear occurred, breech delivery had taken place. The author concludes that many infants with quite extensive birth hemorrhages are born alive and survive.   NORMAN F. MILLER.

Cameron, Hector Charles and Osman, A. A.: The Late Results of Meningeal Hemorrhage of the Newborn. British Medical Journal, March 3, 1923, No. 3244, p. 363.

There is general agreement that meningeal hemorrhage is by far the most common cause of death in fresh nonmacerated fetuses and in infants dying shortly after the conclusion of labor. It is impossible not to conclude with Osler, that many, and perhaps the larger number, escape with their lives but suffer permanent damage in varying degree. There are, however, difficulties in the way of unqualified acceptance of the view that in the numerous cases of cerebral diplegia which present themselves later in life, we are encountering the aftermath of this damage at the moment of birth.

Apart from meningeal hemorrhage two other views have been held of the origin of cerebral diplegia dating from birth. Some writers regard the majority of cases as due to infective meningoencephalitis, intranatal or neonatal. To assess the part played by developmental defect in the production of cerebral paraplegia and diplegia is even more difficult.

The authors wish to stress the high degree of mental development which many of these children damaged at birth ultimately achieve, however great the delay in acquiring certain functions may be in infancy and early childhood.

After recovery from the initial shock of the hemorrhage it is clear that, as a rule, a period of latency follows which lasts for many months. A consideration of the order in which the different parts of the brain are developed explains the length of the interval which usually intervenes between birth, when the damage is sustained, and the time when the child is brought to the doctor and complaint is made of failure to grasp, to sit, to walk, or to speak.

A long and close study of a group of some thirty of these cases, of all ages from earliest infancy to adolescence, has convinced the writers that they differ unmistakably from cases of primary mental defect with spasticity due to developmental causes.

Among cases of infantile diplegia or paraplegia it is possible to recognize a group in which the defect is confined to the sensorimotor cortical areas. Probably all cases in this group are due to birth injury, although all cases of birth injury may not belong to the group.

Since education at first proceeds almost entirely by sensorimotor paths there is in early childhood a deceptive appearance of gross mental defect. In later childhood progress may be rapid and recovery almost complete. The difficulty is overcome by the remarkable persistence in effort which is characteristic of most of these children. Even when voluntary movements remain stiff and awkward the child may be a quick learner by eye and ear. Incoordination may remain though character and intelligence may be on a high plane.   F. L. ADAIR.

Ballantyne, J. W.: Antenatal, Intranatal, and Neonatal, Death: Causes, Pathology, and Prevention, with Special Reference to Antenatal Death. British Medical Journal, September 30, 1922, No. 3222, p. 583.

The author reviews investigations and work done relative to stillbirths. He thinks the following statements may be assumed to be fairly accurate: (1) That there is a great loss of life in the form of stillbirths, the large proportion being due to venereal maladies. (2) There is a great gain in preventing these stillbirths by antenatal supervision and treatment even in the worst group of cases, namely, the venereal infection. (3) That the vast number of stillbirths are preventable.

The general conclusion of the whole matter seems to be that whilst much remains to be done in the study of the causes and pathology and pathogenesis of

stillbirths it is possible to go forward at once in the prevention of them by ante-natal supervision and treatment with bright hopes of substantially reducing their number. Therefore every expectant mother and her unborn infant ought to be able to receive efficient and adequate antenatal care either from her own doctor or through the maternity hospitals and homes of her native land. F. L. ADAIR.

Holland, Eardley: Intranatal Deaths. British Medical Journal, September 30, 1922, No. 3222, p. 588.

Examination of a large number of stillborn fetuses shows that more have died from complications of labor than from maternal or fetal diseases. These fetuses are healthy and therefore worth saving. Classification of the causes of intra-natal death is a very difficult matter; for instance, in a case of placenta previa the immediate cause of fetal death may be a cerebral hemorrhage due to manipu-lation made in attempting to control the maternal hemorrhage. A practical classi-fication, therefore, is needed under the various primary causes—namely, maternal states, placental states, and fetal states. Evidence can be found at postmortem examinations that the complications of labor account for 51 per cent of fetal deaths. This postmortem evidence consists as a rule in the presence of cerebral or visceral hemorrhages. In half the cases it is found that the tentorium cere-belli has been torn. This condition has been found in 88 per cent of dead fetuses after normal breech delivery. The present teaching is to hurry the delivery of the aftercoming head for fear of pressure on the cord. In light of the evidence now brought forward this teaching must be revised, as actually the fetus is killed by compression of the head, brought on principally by forcible efforts being made to complete the extraction of the child. The head, therefore, should be allowed time, even so long as ten minutes if absolutely necessary. F. L. ADAIR.

Browne, F. J.: Neonatal Death. British Medical Journal, September 30, 1922, No. 3222, p. 590.

The author reports a series of 400 cases of stillbirths and neonatal deaths. In this series there were 153 neonatal deaths. The causes of death in these cases were fifty-three deaths from cerebral hemorrhage, most of them intraventricular, and suprarenal hemorrhage in twenty-seven. Only six of these were born alive. Hemorrhages were also found in other portions of the body. There were thirty-five neonatal deaths due to syphilis. Pneumonia was found present in forty-eight of the cases, being the most common cause of postnatal death. The author pre-sents the following recommendations regarding the prevention of neonatal death: First, adequate supervision during pregnancy to prevent deaths from birth injuries and preventable infections. Second, the guarding of the infant against contact infections. Third, more careful training of students in obstetric practice.

F. L. ADAIR.

Kaiser: Hemorrhagic Disease of the Newborn. New York Medical Journal, 1922, cxvi, 156.

Hemorrhagic disease of the newborn occurs in one of every one hundred births. The etiology and pathology of the disease is still obscure, but there exists a dis-turbance of the prothrombin-antithrombin balance. Intracranial hemorrhage is frequently a local manifestation of a hemorrhagic diathesis rather than of trau-matic origin. Hemorrhagic disease occurs in an easy labor as often as in a diffi-cult one. Injections of whole blood, of serum or of prothrombin given early

materially improve the chance for recovery. The early use of spinal puncture with a hypodermic injection of serum in the case of suspected intracranial hemorrhage is advocated.   MARGARET SCHULZE.

Falls, F. H.: Blood Transfusion by the Citrate Method in Hemorrhages of the Newborn. Journal American Medical Association, 1923, lxxx, 678.

A comparison of the different methods of utilizing adult blood for the control of hemorrhage in the newborn is made and the technic for procedure is given in detail. Citrated blood is injected into the jugular vein which is exposed by an incision. Grouping is not done, for as Falls points out, the hemagglutinins and precipitins are not developed in the child to any great extent until the second year. He claims for the method simplicity, safety, and better results than can be obtained by any other method of blood transfusion.   W. KERWIN.

Jacobs, Max W.: Retinal Hemorrhages in the Newborn. Journal of American Medical Association, 1924, lxxxiii, 1641.

A series of 190 infants was examined after birth with the purpose of noting injuries of the eyegrounds. Of 157 examined within the first twenty-four hours and mainly considered in this paper, 19 (12.1 per cent) showed retinal hemorrhages, which were either arranged radially about the disk or were of circular form. Thirty-six per cent of the injuries occurred in primiparous mothers, 68 per cent in multiparas. In eight of the nineteen cases a perineal forceps had been applied; two contracted pelves were among the nineteen cases. The writer emphasizes that such traumatic lesions frequently result in permanent changes within the eye. He does not go into detail as to the probable cause of the hemorrhages in these nineteen instances, but in regard to the etiology of retinal hemorrhages refers to the theories collected in Ehrenfest's monograph.   GROVER LIESE.

Crothers: Injury of the Spinal Cord in Breech Extraction as an Important Cause of Fetal Death and of Paraplegia in Childhood. American Journal of Medical Sciences, 1923, clxv, 94.

The cause of spinal cord injury and its effect, either paralysis or death, is taken up by Crothers, and with the aid of results in animal experiments and war injuries, he is able to show that immediate death is dependent on some other factor aside from the cord injury itself. He explains why birth injuries to the cord are caused by breech extraction and details the history of five cases. He offers the suggestion that herniation of the medulla through the foramen magnum produced by the pressure on the aftercoming head is responsible for death. This would preclude the theory that fetal death in breech extraction is practically always due to asphyxia.   W. KERWIN.

Stern, A.: Etiology of Congenital Torticollis. Monatsschrift für Geburtshilfe und Gynaekologie, 1924, lxv, 179.

A baby with marked wry-neck was delivered by cesarean section from a patient who was 43 years old. The child had presented by the breech, and labor had continued for forty-eight hours without much progress. After birth the head of the baby remained flexed on the left side at an angle of 45 degrees. On the left side of the baby's neck was a marked depression due to atrophy of the muscle. Into this, the left shoulder fitted snugly.

In this case the theory that torticollis is due to birth injury of the sternocleidomastoid muscle can be ruled out. Neither was there an intrauterine myositis. During labor the breech of the fetus rested on the symphysis and the uterus hung forward. The membranes ruptured early and during the forty-eight

hours of labor the pains increased the abnormal deviation of the fetal head. This and the position of the fetus during the last few months of pregnancy, which remained unchanged, explain the deformity of the child. This case supports the theory that congenital torticollis is due to an abnormal attitude and lack of space in the uterus. It also illustrates that the pressure of the shoulder against the neck produces atrophy of the neck muscles through disturbances in the vascular circulation. J. P. GREENHILL.

Boorstein: Obstetric Brachial Paralysis. Journal American Medical Association, 1924, lxxxii, 862.

Boorstein speaks of the common occurrence of obstetric brachial paralysis and warns against an early ill-prognosis by the attending obstetrician. Early treatment by the orthopedist is urged. In a study of sixty-four patients some interesting phases of etiology are brought out. Types and methods of treatment with reference to the literature are detailed. The worker's conclusions are:

Obstetric brachial paralysis is due to stretching or tearing of the cervical roots of the brachial plexus. It is almost always associated with a difficult labor, in many instances, forceps having been used. The right side is more often affected than the left. Affection of both arms is very infrequent. The upper arm type is due to injury of the suprascapular, and fifth and sixth cervical nerves. It is much more frequent than the lower arm type. The whole or lower arm type is due to injury of the entire plexus.

Vertex presentation shows the larger percentage of occurrences of both types of cases. Improper management of the shoulder is responsible for many cases; hence they may be prevented by the obstetrician. If these cases are treated early and properly, one may expect in the mild cases a good recovery in three or four months. The more severe cases will require about six or seven months for a complete recovery.

Nerve operations are indicated if no advance is made in four months. After that period, if sufficient improvement is noticed, one may wait four months more, provided, of course, proper orthopedic treatment is continued. W. KERWIN.

Ehrenfest, Hugo: The Prevention of Birth Injuries of the Child. Illinois Medical Journal, 1923, xliv, 20.

In this paper the writer discusses briefly all the various types of injuries which by no means are limited to the infant's cranium. In his concluding remarks the author makes the following statements: I lay stress on the fact that the child can be more or less severely traumatized also in a normal labor, in a spontaneous labor, if we grant that the term "spontaneous" by common consent includes as well deliveries in which the expulsion of the fetus is actually hastened by a dose of pituitrin. In by far the larger number of instances, however, serious traumas are observed after labors terminated by operations or other artificial means. In this larger group, lack of skill admittedly is an etiologic factor of considerable importance. It may be lack of diagnostic ability, a lack of judgment, or mere awkwardness of technic, not rarely superinduced by bewilderment or by undue haste. I wish to place the accent on "haste." Routine version followed by immediate extraction to eliminate the second stage of labor, forceps extractions even on high heads to shorten labor, forceps extractions in the second stage of twilight labors to avoid the inevitable delay through the elimination of important accessory expulsive forces, large doses of pituitrin often given in short intervals, all these procedures find their enthusiastic advocates in modern obstetric literature. Do they, in their last analysis, express anything else but haste of some sort? Is this haste in the interest of the mother entirely free of harm to the child? I answer this question with an emphatic "no." R. E. WOBUS.

Füth: Spasmodic Cervical Contraction and Injury to the Child's Head during Labor. Zeitschrift für Geburtshülfe und Gynäkologie, 1923, lxxxvi, 633.

The author reports a personal case and cites several cases from the literature, in which a ringlike pressure necrosis of the soft tissues of the child's head resulted from a spasmodic contraction of the cervix about it. In all cases, labor was prolonged and there was premature rupture of the membranes. In several cases, it could be definitely demonstrated that the spasm was at the internal rather than the external os, and the author believes that this holds true in all cases. The condition appeared in two successive labors in the author's and one other case, although there was no pelvic contraction or other demonstrable cause. Several of the children died as the result of infection of the necrotic area.

MARGARET SCHULZE.

Heidler, H.: Congenital Defects of the Scalp. Wiener Klinische Wochenschrift, 1924, xxxvii, 114.

Heidler states that despite the fact that there are only forty-two cases of congenital defects of the scalp reported in the literature, this anomaly is much more frequent than is generally supposed. In many cases the defect is small, and is therefore overlooked or is considered as a birth injury. Among the cases reported in the literature are many defects measuring as much as 7-9 cm. The case reported by the author was a full-term child weighing 2610 gms. and showed no signs of prematurity except a dense lanugo. Over the parietal bone there was a defect, 5 cm. by 2.5 cm., the floor of which was a gray, opaque, moist membrane. The margins of the defect were sharply defined and surrounded by normal hairy scalp except anteriorly where there was an area in which the hair was missing. The bone was also missing under this defect of the scalp and that portion of the parietal bone lying anteriorly to the defect was soft and spongy in consistency. In the first days following birth the moist membrane forming the base of this defect underwent mummification and dry gangrene. When four weeks of age, a severe hemorrhage occurred which required compression bandages to control the bleeding, and following this, bleeding occurred whenever the child cried. When two months old meningitis set in and death occurred. A partial autopsy revealed the fact that the bleeding occurred from the longitudinal sinus. The author comments on the striking similarity between this case and one reported by Moelle which had a similar structure and termination. He then considers the various theories as to its etiology. He does not believe such defects to be due to amniotic adhesions but states that they are primary inhibitions of development of unknown etiology.

RALPH A. REIS.

Walz, W.: Etiology of Congenital Skin Defects of the Scalp. Monatsschrift für Geburtshilfe und Gynaekologie, 1924, lxv, 167.

Three cases of congenital defect of the skin of the scalp were observed by the author. On the basis of these cases and a review of the literature the author condemns their amniotic origin. While for an occasional case the amniotic origin may be the right one, it is certainly not the determining factor in the majority of cases. The author believes that these skin defects just like harelip, syndactylism, etc., have an endogenous causation. The congenital skin defects of the scalp show the following etiologic progressive stages: acrania, hemicrania, encephalocele, congenital defect of the scalp.

J. P. GREENHILL.